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MENTAL UNEVENNESS AND BRIGHTNESS

HERBERT WOODROW

University of Oklahoma

By the mental unevenness of an individual is here meant the mean of the deviations of his various abilities from their own average—the various abilities being measured in comparable units. The most natural way to make a comparison of groups of individuals with respect to mental unevenness, when so defined, is first to calculate the mean variation in each individual's traits, and then to calculate for each group of individuals the average of the individual mean variations. This, in general, is the method which has been used in the present investigation of the relationship between mental unevenness and brightness in 1572 school children classified in groups according to IQ.

The mental abilities considered are six abilities tested by the separate tests of a battery which has been standardized as an intelligence test. As these tests have been described elsewhere,[1] it will suffice to list them, as follows: *Language Completion, Substitution, Comprehension, Opposites, Word Building, Memory Span for Digits.*

Each of these six tests was given in two parallel forms, one form being used on each of the two days, approximately one month apart, on which the child was tested. Every score used in the present study, therefore, is an average of two scores made on parallel forms.

The scores which have been studied are those of all the children in the public schools of a small town whose MA fell between the limits 8 yrs. 0 mos. and 16 yrs. 11 mos. inclusive. These limits were chosen

[1] See Arthur, G., and Woodrow, H.: An Absolute Intelligence Scale: A Study in Method. *Journal of Applied Psychology*, 1919, **3**, 118–137, and Arthur, G.: A Group Point Scale for the Measurement of Intelligence. *Journal of Applied Psychology*, 1926, **10**, 228–244. The crude scores and mental ages of the children here studied were obtained and kindly furnished the writer by Miss Arthur.

as representing the lowest and highest levels at which the tests were entirely adequate. Since the tests used constitute a battery for the measurement of intelligence, a battery which correlates very highly with the Kuhlmann-Binet individual intelligence tests,[1] mental age was determined by this battery. The mental ages may not be accurate at the higher ages, and presumably are *not*, since they are standardized on school children showing the usual influence of selection at the higher ages. With these children there was no cessation of the increase in test scores with age, at any age up to 18.5 yrs. so that, as standardized, the tests give norms for MA's extending up to 18.5 yrs. The fact that these norms are presumably inaccurate at the higher mental ages is of little concern in the present study. Here the primary use of mental ages is to group together children of the *same* level of ability. Whether this level is given a perfectly correct label is inconsequential.

The correlation between the scores of each of the six tests with each of the others was calculated for the 10.5 yrs. (10 yrs. 0 mos. to 10 yrs. 11 mos. inclusive) and the 12.5 yrs. CA groups. For the 10.5 yr. group, numbering 227, the correlations ranged from +.04 to +.62 and averaged +.34; for the 12.5 yr. group, numbering 207, they ranged from +.19 to +.61 and averaged +.35.

TABLE I.—DISTRIBUTION OF CHILDREN BY CA AND IQ

CA	IQ									Total
	Below 70	70–79	80–85	86–95	96–104	105–114	115–120	121–130	Above 130	
7:0– 7:11	..	..	...	...	9	47	10	12	1	79
8:0– 8:11	..	..	...	22	66	44	21	10	5	168
9:0– 9:11	..	..	11	64	76	50	18	10	6	235
10:0–10:11	..	6	20	58	56	43	22	19	3	227
11:0–11:11	1	6	27	63	44	52	25	6	8	232
12:0–12:11	1	13	25	42	60	36	14	14	2	207
13:0–13:11	4	10	17	43	33	45	15	7	..	174
14:0–14:11	4	8	15	49	27	15	1	..	..	119
15:0–15:11	3	12	13	20	18	11	...	..	..	77
16:0–16:11	1	5	9	9	7	...	...	..	..	31
17 or over	1	3	3	7	9	...	...	..	..	23
Total.....	15	63	140	377	405	343	126	78	25	1572

[1] See Arthur, *op. cit.*, p. 238.

The distribution of the children by MA and IQ may be seen from Table II. Their distribution by CA and IQ is given in Table I. The lack of cases of low IQ and low CA, as well as of high IQ and high CA, is due to the fact already mentioned, that the children chosen for study were those whose mental age fell within the range 8 yrs. 0 mos. to 16 yrs. 11 mos. inclusive.

In order to calculate the MV of any child's six scores, it was necessary first to express all the scores in comparable units. This was done by two methods, and the results obtained by each method will be presented, though each leads to the same conclusions as regards the relationship between IQ and mental unevenness. The first method of changing original scores into comparable units consisted in substituting for each score the corresponding mental age score. Norms were at hand for each half year of CA for each test. By interpolation, norms were obtained for every tenth of a year, and arranged in the form of a table. By the aid of this table, each of the 9432 original scores was changed into the age to the nearest tenth of year at which it would be the average score of normal children.

The second method made use of standard scores. These were obtained as follows: The children were first classified in class intervals of one year of MA. All children whose MA fell in the interval extending from 8 yrs. 0 mos. to 8 yrs. 11 mos., inclusive, were put in one group, called the *8.5 yrs. MA group;* those of MA 9 yrs. 0 mos. to 9 yrs. 11 mos. in the next group, called the *9.5 yrs. MA group;* etc. Next, all the test scores made by the children of any MA group were changed into deviations from the average scores made by the corresponding CA group. Thus, the score of a child in the 8.5 yrs. MA group in the substitution test was recorded, with its sign, as the deviation of his score from the 8.5 yrs. CA norm. This deviation, in original units, was then divided by the $\sigma_{dis.}$ of the substitution test scores made by the 8.5 yrs. CA group. A similar procedure was followed in the case of the six test scores of each child. In this way, all the scores of the children of any one MA group were transformed into deviations from the same norms, and then divided by the same standard deviations. The standard scores of all children of the same MA were thus arrived at in the same manner, no matter what might be their IQ's.

After each of the 9432 scores had been tabulated in comparable units, whether as mental age scores or standard scores, the scores of each of the 1572 individuals were averaged, and then the mean variation of each individual was calculated. While this procedure is

very simple, in order to avoid any possible misunderstanding, it will be illustrated in the case both of mental age scores and of standard scores by the following typical example. A child of MA10 yrs. 6 mos. and IQ 85 obtains in the six tests mental age scores in years as follows: 10.8; 9.8; 10.9; 13.5; 11.6; and 8.0. The average of these scores is 10.8 yrs. (This average, 10.8 yrs., does not agree with the assigned mental age, 10.6 yrs., because the latter was determined on the basis of a weighted average.) From the average, 10.8 yrs., the mean variation of the six individual scores is then calculated and found to be 1.2 yrs. This mean variation is taken as one measure of the unevenness of the child. This same child shows crude score deviations from the 10.5 yrs. CA norms for the various tests, as follows: +.4; −4.8; +1.0; +4.2; +1.2; −1.1. Each of these deviations is then divided by the $\sigma_{dis.}$ of the 10.5 yrs. CA group for the corresponding test. These divisions result in the standard scores, +.11; −.44; +.23; +1.62; +.38 and −1.10, the average of which is +.13. The mean variation from this average, that is, the mean variation in the standard scores, is .61, which is used as a second measure of the mental unevenness of the child.

The computations which have just been illustrated were carried out on each of 1572 children, and thus for each child there were obtained two measures of unevenness, one in terms of mental age and the other in terms of standard scores.

In order to determine the relationship between unevenness and IQ, the children were first classified according to MA and IQ as indicated in Table II. The grouping as regards MA was in class-intervals of 0.5 yrs.,[1] and as regards IQ, in class-intervals as follows: below 70; 70–79; 80–85; 86–95; 96–104; 105–114; 115–120; 121–130; and above 130. After the children were thus classified according to MA and IQ, the average unevenness of all the children in each MA-IQ cell was calculated, the unevenness of each child having been determined in the manner already explained.

Table II shows the average unevenness of the children of each MA-IQ cell, when unevenness is calculated in terms of years. One of the most striking points established by this table is the increase in unevenness with increase in MA. For the IQ group 96–104, *i.e.*, for normal children, or children whose MA and CA are very nearly

[1] In the tables, the MA class interval 8 yrs. 0 mos. to 8 yrs. 5 mos., inclusive, is labelled 8¼; that from 8 yrs. 6 mos. to 8 yrs. 11 mos. inclusive, 8¾ yrs.; etc.

TABLE II.—AVERAGE UNEVENNESS FOR EACH MA-IQ GROUP, THE UNEVENNESS OF EACH CHILD BEING MEASURED BY THE MEAN VARIATION OF HIS MENTAL AGE SCORES

TABLE II.—AVERAGE UNEVENNESS FOR EACH MA-IQ GROUP, THE UNEVENNESS OF EACH CHILD BEING MEASURED BY THE MEAN VARIATION OF HIS MENTAL AGE SCORES

Each cell contains 3 numbers: the first is the average unevenness of the children of the IQ and MA corresponding to the cell in question; the second (in italics) is the $MV_{dis.}$; the third is the number of children included.

MA group 8¼ includes all children of MA's 8:0 to 8:5 inclusive; MA group 8¾, all children of MA 8:6 to 8:11 inclusive; etc.

IQ	Mental age																	
	8¼	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¼	12¾	13¼	13¾	14¼	14¾	15¼	15¾	16¼	16¾
Below 70	1.30	1.30	1.35	1.47	1.30	1.50												
	.33	*.10*	*.25*	*.43*	*.10*	*.40*												
	3	2	2	3	2	3												
70–79	.83	1.08	1.25	1.01	1.64	1.33	1.56	1.90	1.95	1.68								
	.17	*.36*	*.05*	*.36*	*.89*	*.23*	*.36*	*.40*	*.25*	*.28*								
	9	5	2	10	8	6	7	6	6	4								
80–85	.88	.98	1.11	.96	1.05	1.47	1.65	1.41	1.30	1.65	1.87	1.67						
	.26	*.42*	*.31*	*.31*	*.38*	*.66*	*.32*	*.52*	*.56*	*.58*	*.45*	*.23*						
	18	10	13	22	14	11	7	10	11	11	10	3						
86–95	.84	1.01	1.00	1.08	1.34	1.19	1.49	1.48	1.35	1.64	1.80	2.31	2.27	2.16	2.29			
	.30	*.37*	*.31*	*.32*	*.45*	*.48*	*.41*	*.46*	*.46*	*.50*	*.49*	*.66*	*.53*	*.26*	*.61*			
	50	28	32	36	40	29	19	14	24	43	28	8	10	9	7			
96–104	.68	.80	1.02	1.10	1.22	1.16	1.31	1.30	1.44	1.65	1.94	1.76	2.05	1.75	1.65	1.91	1.74	1.70
	.25	*.27*	*.28*	*.40*	*.43*	*.37*	*.31*	*.35*	*.40*	*.55*	*.50*	*.54*	*.53*	*.49*	*.33*	*.58*	*.42*	*.28*
	45	29	36	38	38	15	23	21	25	35	24	10	13	14	10	14	10	5
105–114	.65	.83	.96	.86	1.09	1.31	1.36	1.48	1.73	1.93	1.89	1.95	2.11	2.07	2.03	1.96	1.89	2.09
	.17	*.28*	*.37*	*.23*	*.36*	*.55*	*.49*	*.43*	*.65*	*.58*	*.46*	*.50*	*.54*	*.53*	*.43*	*.44*	*.47*	*.46*
	36	21	20	20	35	10	16	23	19	29	21	11	19	15	20	8	9	11
115–120	1.50	.97	.95	.98	1.33	.86	1.16	1.35	2.05	1.55	1.90	1.65	2.40	1.71	2.08	2.00	1.91	1.40
	.30	*.50*	*.15*	*.40*	*.60*	*.21*	*.11*	*.78*	*.60*	*.66*	*.40*	*.45*	*.00*	*.41*	*.65*	*.50*	*.44*	*.00*
	2	6	4	12	8	7	8	6	8	11	21	2	1	9	6	6	8	1
121–130	.95	....	1.05	.93	2.00	1.20	1.38	1.28	1.68	1.85	2.23	2.50	2.40	2.10	2.48	2.17	1.82	1.77
	.00	....	*.26*	*.33*	*.45*	*.00*	*.35*	*.28*	*.36*	*.65*	*.68*	*.00*	*.60*	*.40*	*.46*	*.48*	*.42*	*.57*
	2	....	5	6	4	2	6	4	7	10	4	1	2	6	5	4	4	6
Above 130	....	....	....	.90	....	....	1.80	1.20	2.10	1.95	2.30	3.20	2.26	....	2.00	1.90	2.20	2.15
				.00	....	....	*.00*	*.25*	*.00*	*.90*	*.00*	*.00*	*.15*	....	*.20*	*.40*	*.50*	*.652*
				1	....	....	1	4	1	4	1	1	2	....	3	3	2	

the same, the average unevenness, when calculated for each whole-year MA group is as follows:

TABLE III.—MENTAL UNEVENNESS (IN TERMS OF YEARS) AND MA IN THE CASE OF NORMAL CHILDREN (CHILDREN OF IQ 96–104)

MA	Average unevenness, years	$MV_{av.}$	N
8.5 (8:0– 8:11)	.74	.032	74
9.5 (9:0– 9:11)	1.06	.040	74
10.5 (10:0–10:11)	1.19	.058	53
11.5 (11:0–11:11)	1.31	.050	44
12.5 (12:0–12:11)	1.55	.055	60
13.5 (13:0–13:11)	1.85	.078	34
14.5 (14:0–14:11)	1.90	.100	27
15.5 (15:0–15:11)	1.78	.096	24
16.5 (16:0–16:11)	1.72	.094	15

Whether the increase in mental unevenness of normal children is directly proportional to the increase in MA cannot with certainty be determined from the above data, owing to rather marked deviations from the general trend, both in the lowest MA group, 8.5 yrs., and in the two highest MA groups, 15.5 and 16.5 yrs.

The form in which the data are presented in Table II is not the best for the purpose of determining the relationship between unevenness and IQ. The number of children in the various IQ groups is not sufficient in the case of any one MA group to afford reliable comparisons. On the other hand, the IQ groups cannot be compared irrespective of MA, because of the enormous effect of MA upon unevenness, and because of the fact that the MA distribution differs widely with the IQ group. As is inevitable, in the lower IQ groups, the lower MA's are relatively more frequent; and in the higher IQ groups, the higher MA's are relatively more frequent. Among the children whose IQ's were below 70, there was none with a mental age over 11.0 yrs. To overcome these difficulties, a table has been constructed (Table IV), in which the unevenness of each of the various IQ groups of any one MA is expressed as its ratio to the unevenness of normal children of that MA. For example, the average unevenness of children in the half-year MA group 8¼ and in the IQ group 70–79 is .83 yrs. This is .83/.68, or 1.22 times, the unevenness of normal children in the same MA group, the average unevenness of the latter being .68 yrs. The average uneven-

ness of each IQ group of the 8¼ MA children has been similarly treated, that is, has been divided by the average unevenness of the normal 8¼ MA group. A similar procedure has been followed in the case of the children in each half-year MA group (each column of Table II). This amounts simply to taking as equal to 1.00 the unevenness of the normal children of any MA group, and in this way eliminating the effect of mental age. The resulting ratios shown by the various IQ groups may then be averaged to arrive at the effect of IQ irrespective of MA. The effect of IQ on unevenness, with the influence of MA eliminated, may consequently be determined by a comparison of the average ratios of unevenness of the different IQ groups. In

TABLE IV.—AVERAGE UNEVENNESS OF EACH MA-IQ GROUP, WHEN THE UNEVENNESS OF EACH CHILD IS EXPRESSED AS A RATIO OF THE AVERAGE UNEVENNESS OF NORMAL CHILDREN OF HIS OWN MA

IQ	Mental age								
	8¼	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¼
Below 70	1.91	1.63	1.57	1.34	1.07	1.29			
70–79	1.22	1.35	1.23	.92	1.34	1.15	1.19	1.46	1.34
80–85	1.29	1.23	1.09	.87	.86	1.27	1.26	1.09	.90
86–95	1.24	1.26	.98	.98	1.10	1.03	1.14	1.14	.93
96–104	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
105–114	.96	1.04	.94	.78	.89	1.13	1.03	1.14	1.19
115–120	2.21	1.21	.93	.89	1.09	.74	.88	1.04	1.41
121–130	1.13	....	1.03	.85	1.64	1.03	1.05	.99	1.17
Above 130	....	....	....	.82	....	....	1.37	.92	1.45

IQ	Mental age									Av.—all MA's
	12¾	13¼	13¾	14¼	14¾	15¼	15¾	16¼	16¾	
Below 70	....	....	....	....	....	....	....	....	....	1.46
70–79	1.03	....	....	....	....	....	....	....	....	1.21
80–85	1.00	.97	.95	....	....	....	....	....	....	1.06
86–95	1.00	.94	1.32	1.11	1.23	1.40	....	....	....	1.09
96–104	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
105–114	1.18	.98	1.11	1.03	1.18	1.24	1.02	1.08	1.23	1.05
115–120	.95	.99	.94	1.18	.97	1.27	1.04	1.09	.83	1.04
121–130	1.13	1.16	1.43	1.18	1.20	1.51	1.13	1.04	1.04	1.14
Above 130	1.19	1.20	1.82	1.07	....	1.22	.99	1.25	1.27	1.16

such comparisons, it is important to have some measure of the dispersion of the ratios of unevenness of the individual children composing any IQ group. As such a measure, the $PE_{av.}$ of each IQ group has been calculated. These PE's are here recorded only for the five IQ groups listed in Table V, a table which summarizes Table IV.

The average unevenness of each IQ group is given in the last column of Table IV, headed "Av.—all MA's." This column reveals a general tendency for mental unevenness to increase as the IQ increases in distance either above or below normal. The increase in mental unevenness does not become pronounced, however, until the IQ deviates from 100 by at least 20 points. The variation in unevenness with slight change in IQ is not great enough to merit such narrow grouping of the IQ's as used in Table IV. The relationship between IQ and unevenness may be brought out more clearly and with greater reliability by a broader grouping of IQ's. Consequently, the average unevenness of each IQ group has been calculated, with the children classified in only five IQ groups, namely, the normal group, 96–104; two inferior groups, 80–95 and below 80; and two superior groups, 105–120 and above 120. The results are given in Table V.

TABLE V.—AVERAGE UNEVENNESS IN MENTAL AGE SCORES OF DIFFERENT IQ GROUPS, RELATIVE TO THE UNEVENNESS OF NORMAL CHILDREN (IQ 96–104)

IQ group	Average	N	$PE_{av.}$	D/PE_D
Below 80	1.258	78	.040	6.1
80–95	1.082	517	.013	4.4
96–104	1.000	405	.013	0.0
105–120	1.047	469	.014	2.5
Above 120	1.145	103	.029	4.5

Average = average relative unevenness.

D/PE_D = difference between the average unevenness of the normal group (IQ 96–104) and the average unevenness of the group in question, divided by PE_D.

Table V establishes with adequate reliability that, on the average, both bright and dull children show greater mental unevenness than normal children (those of IQ 96–104). Compared with normal children, those whose IQ is below 80 show 25.8 per cent more unevenness, and those whose IQ is above 120 show 14.5 per cent more unevenness.

Even the IQ group 80–95 shows an increase of 8.2 per cent beyond the normal in unevenness and this increase, on account of the large number of children in the group, is statistically significant. While the table indicates that children below normal in IQ show greater unevenness than those above normal, such a conclusion is not established with any great reliability, for the difference between the inferior and the superior groups is not great enough to be significant. Thus, while the difference between the 80–95 IQ group and the normal group is equal to 4.4 times its PE, that between the 80–95 and the 105–120 groups is only 1.8 times its PE. Similarly, while the difference between the group below IQ 80 and the normal group is 6.1 times its PE, that between the group below 80 and the one above 120 is only 2.3 times its PE.

The conclusions brought out by Tables II to V hold only for unevenness as measured by the mean variation in scores expressed in terms of mental age. As a check upon the conclusions established by these tables, it appeared desirable to determine the relationship between IQ and unevenness when the latter is calculated in terms of standard scores. The method of calculating such measures of unevenness has already been described. It consists simply in the determination of the mean variation of the standard scores of each child. It hardly needs to be pointed out that, with any one MA group, variation in σ with age has no effect on such measures of unevenness, since the deviations from the average shown by the scores of all children of the same MA were, in the case of any one test, always divided by the same σ. It is true that different σ's have been used in the case of different MA groups, but once the average unevenness of the various IQ groups of each MA group has been expressed as a ratio, as in Table VII, the effect of the magnitude of the σ's is eliminated. The ratios would remain the same even though the σ's used with one MA group were doubled or trebled while those used with another MA group were halved.

The results obtained when unevenness is calculated in terms of standard scores are presented in Tables VI and VII, which are analogous to Tables II and IV, on unevenness in terms of MA. In Table VII, mean variations of the average ratios have been omitted. The MV of any average in Table VII may be obtained, however, simply by multiplying the mean variation as given in Table VI by the quotient obtained by dividing the average in Table VII by the corresponding average in Table VI.

TABLE VI.—AVERAGE UNEVENNESS FOR EACH MA-IQ GROUP, THE UNEVENNESS OF EACH CHILD BEING MEASURED BY THE MEAN VARIATION IN HIS STANDARD SCORES

Each cell contains 2 numbers: the first is the average of the mean variations in *z*-scores of the children concerned; the second (in italics) is the MV_{dm}. *N*, for each cell, may be obtained from Table II.

IQ	Mental age								
	8¼	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¼
Below 70	.71	.77	.63	.80	.60	.79			
	.24	*.02*	*.00*	*.21*	*.07*	*.10*			
70–79	.60	.63	.86	.57	.74	.56	.66	.71	.75
	.12	*.22*	*.11*	*.23*	*.37*	*.13*	*.15*	*.22*	*.13*
80–85	.53	.50	.57	.56	.45	.60	.56	.57	.49
	.12	*.12*	*.12*	*.18*	*.13*	*.21*	*.09*	*.16*	*.17*
86–95	.51	.59	.51	.59	.57	.49	.63	.55	.44
	.13	*.16*	*.14*	*.16*	*.13*	*.18*	*.14*	*.15*	*.11*
96–104	.41	.48	.52	.56	.56	.49	.53	.52	.52
	.14	*.15*	*.12*	*.16*	*.18*	*.15*	*.15*	*.14*	*.13*
105–114	.42	.47	.48	.45	.45	.55	.51	.54	.51
	.11	*.13*	*.18*	*.15*	*.12*	*.18*	*.13*	*.15*	*.17*
115–120	.48	.52	.62	.51	.48	.39	.43	.50	.65
	.12	*.21*	*.18*	*.19*	*.14*	*.10*	*.09*	*.30*	*.22*
121–130	.40	...	.47	.50	.66	.52	.52	.47	.52
	.00	...	*.10*	*.15*	*.11*	*.09*	*.12*	*.16*	*.08*
Above 130	...	...	...	.50	...	...	.61	.44	.63
				.00	...	...	*.00*	*.10*	*.00*

IQ	Mental age								
	12¾	13¼	13¾	14¼	14¾	15¼	15¾	16¼	16¾
70–79	.62								
	.11								
80–85	.65	.61	.45						
	.23	*.17*	*.12*						
86–95	.60	.55	.76	.67	.60	.63			
	.17	*.15*	*.27*	*.17*	*.11*	*.18*			
96–104	.57	.61	.50	.56	.49	.44	.42	.41	.41
	.20	*.17*	*.19*	*.16*	*.13*	*.12*	*.19*	*.11*	*.07*
105–114	.67	.58	.59	.58	.62	.57	.55	.49	.58
	.12	*.15*	*.19*	*.16*	*.19*	*.13*	*.15*	*.13*	*.12*
115–120	.49	.57	.55	.69	.52	.58	.59	.58	.41
	.19	*.13*	*.16*	*.00*	*.17*	*.23*	*.15*	*.22*	*.00*
121–130	.62	.67	.93	.62	.50	.73	.66	.55	.60
	.17	*.22*	*.00*	*.13*	*.15*	*.09*	*.20*	*.12*	*.23*
Above 130	.70	.58	1.03	.57	...	.58	.49	.61	.56
	.28	*.00*	*.00*	*.01*	...	*.10*	*.12*	*.22*	*.25*

TABLE VII.—AVERAGE UNEVENNESS OF EACH MA-IQ GROUP, WHEN THE UNEVENNESS OF EACH CHILD IS EXPRESSED AS A RATIO OF THE AVERAGE UNEVENNESS OF NORMAL CHILDREN OF HIS OWN MA

IQ	Mental age								
	8¼	8¾	9¼	9¾	10¼	10¾	11¼	11¾	12¼
Below 70	1.73	1.60	1.21	1.44	1.07	1.61			
70–79	1.46	1.32	1.63	1.03	1.33	1.12	1.25	1.35	1.43
80–85	1.30	1.05	1.08	1.00	.81	1.20	1.06	1.08	.93
86–95	1.22	1.24	.97	1.06	1.03	1.00	1.20	1.05	.84
96–104	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
105–114	1.01	.99	.91	.81	.81	1.10	.97	1.03	.97
115–120	1.15	1.09	1.18	.92	.86	.78	.82	.95	1.24
121–130	.98	....	.91	.90	1.19	1.04	.99	.89	1.00
Above 130	....	....	....	.89	....	....	1.16	.84	1.20

IQ	Mental age									Av.—all MA's
	12¾	13¼	13¾	14¼	14¾	15¼	15¾	16¼	16¾	
Below 70	....	....	....	....	....	....	....	....	....	1.47
70–79	1.12	....	....	....	....	....	....	....	....	1.28
80–85	1.17	1.00	.90	....	....	....	....	....	....	1.06
86–95	1.08	.88	1.52	1.21	1.20	1.45	....	....	....	1.09
96–104	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
105–114	1.21	.93	1.18	1.04	1.24	1.31	1.32	1.20	1.42	1.04
115–120	.88	.91	1.10	1.24	1.04	1.33	1.42	1.42	1.00	1.03
121–130	1.08	1.10	1.86	1.11	1.02	1.66	1.58	1.34	1.46	1.15
Above 130	1.24	.95	2.06	1.02	....	1.33	1.18	1.49	1.36	1.18

Table VII, in the column headed "Av.—all MA's" shows, irrespective of MA, the effect of IQ upon mental unevenness. By using broader IQ groups, in order to eliminate the irregularity and unreliability resulting from the use of such narrow IQ groups as those of Table VII, the results obtained may be summed up as shown in Table VIII.

As regards the relationship between unevenness and IQ, the averages shown in Tables VII and VIII lead to substantially the same conclusions as those indicated by the data given in Tables IV and V. In general, the unevenness of the lowest and the highest IQ groups is greater than that of the normal IQ group. Table VIII indicates a tendency for the average unevenness in any IQ group to increase with increase in its distance above or below normal. According to this

table, children below IQ 80 show 1.32 times as much unevenness, on the average, as the normal group (IQ 96–104); and those above IQ 120, 1.15 times as much as the normal group. The difference between the average unevenness of the group below IQ 80 and that of the normal group is 8.1 times the PE of the difference between the two averages. The difference between the group above IQ 120 and the normal group is 4.6 times the PE of the difference. In addition to showing that the unevenness of children of either high or low IQ is significantly greater than that of children of normal IQ, Table VIII indicates a greater unevenness for children a given distance below normal than for children the same distance above normal. That the inferior are more uneven than the correspondingly superior is not, however, reliably established. Thus, the children of IQ 80–95 show a difference from those of IQ 105–120 which is only 2.4 times the PE of the difference, and those of IQ below 80 show a difference from those of IQ above 120 which is only 3.4 times the PE of the difference.

TABLE VIII.—AVERAGE UNEVENNESS IN STANDARD SCORES OF DIFFERENT IQ GROUPS, RELATIVE TO THE UNEVENNESS OF NORMAL CHILDREN (IQ 96–104)

Average = average relative unevenness.

D/PE_D = difference between the average unevenness of the normal group (IQ 96–104) and the average unevenness of the group in question, divided by PE_D.

IQ	Average	N	$PE_{av.}$	D/PE_D
Below 80	1.317	78	.037	8.1
80–95	1.082	517	.012	4.6
96–104	1.000	405	.013	0.0
105–120	1.037	469	.014	1.9
Above 120	1.152	103	.030	4.6

The relationship between IQ and mental unevenness which is demonstrated by the data which have been presented above is a relationship which holds only on the average. Children of any given IQ vary greatly in degree of unevenness. Of the children in the IQ group 96–104, 25 per cent would, judging from the $\sigma_{dis.}$ of this group, as calculated from Table V,[1] show greater unevenness than the average amount of unevenness shown by children below 80 in IQ. Clearly, the mental unevenness of any child depends mainly upon factors other than his IQ.

[1] Table V gives the $PE_{av.}$ of the normal group as .013, and N as 405. It follows that the $\sigma_{dis.} = .013\sqrt{405}/.6745$.

The conclusions reached in the present study harmonize very well with Merrill's conclusion[1] that both very bright and very dull children are more uneven on the average than normal children of the same MA; they are not incompatible with De Voss's somewhat hesitant conclusion that exceptionally gifted children are slightly more uneven than normal children;[2] and they do not contradict Brown's conclusion that the unevenness of dull children is not reliably different from that of bright children.[3]

The present data differ from those of De Voss in establishing a significant relationship between IQ and unevenness; from those of Merrill in that they do not show the bright to be more uneven than the dull; and from those of Brown in that they permit comparison of the bright and dull groups not merely with each other, but with the normal group, and in that they permit such comparisons with the effect of MA eliminated.

Summary

The unevenness in the scores made in six mental tests was determined for each of 1572 school children of the mental ages 8 to 16 inclusive by ascertaining, for each child, the mean variation in his scores when the scores were expressed in comparable units. Scores were made comparable by two methods, one leading to a measure of unevenness in units of years and the other, in units of standard deviations. The children were grouped according to IQ and MA, and the average unevenness of each IQ-MA group was calculated. These averages revealed the following general tendencies.

(*a*) Measured in terms of years, mental unevenness showed a marked increase with MA from age 8 to age 14, inclusive.

(*b*) Measured in terms of standard scores, mental unevenness showed considerable fluctuation, but no reliable general tendency either to increase or decrease with MA.

In order to determine the relationship between IQ and unevenness, with the effect of MA eliminated, each child's unevenness was

[1] Merrill, M. A.: On the Relation of Intelligence to Achievement in the Case of Mentally Retarded Children—Thesis—July, 1923; also, same title, *Comparative Psychology Monographs*, **2**, 1924, No. 10.

[2] De Voss, James C.: Specialization of the Abilities of Gifted Children, in *Genetic Studies of Genius*, edited by L. M. Terman, Vol. I, Chap. XII.

[3] Brown, A. W.: "The Unevenness of the Abilities of Dull and Bright Children." Teachers College Contributions to Education, 1926, No. 220, pp. 112.

expressed as a ratio of his unevenness to the average unevenness shown by normal children of his own MA. With the effect of MA thus eliminated, a significant relationship was found between IQ and unevenness. This relationship remained substantially the same whether unevenness was determined from mental age scores or from standard scores. It may be summed up in the following propositions.

(*a*) Children of either low or high IQ showed greater unevenness, on the average, than those of normal IQ (96–104).

(*b*) The higher the IQ, if above normal, or the lower the IQ, if below normal, the greater was the average unevenness.

(*c*) Children below normal in IQ showed greater unevenness than children above normal in IQ, but the data do not establish the difference between the two groups with a high degree of reliability.

WHY CHILDREN HATE. AN EXPERIMENTAL INVESTIGATION OF THE REACTIONS OF SCHOOL CHILDREN OF POLAND TO THE ENEMY OCCUPATION

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The investigation reported in this article was made by Dr. Francisca Baumgarten, a Polish psychologist, in the schools of Warsaw and neighboring Polish towns in 1918 during the occupation of that territory by German troops. The results were so startling that she at once buried the papers in the ground lest they should fall into the hands of the foreign soldiery and not only be destroyed, but bring personal danger. They remained buried for several years until the political situation became more stable, were then dug up and, after a time, were taken to Switzerland where Dr. Baumgarten has made her home since her marriage. But no European publisher has been willing, up to this time, to take the responsibility for publishing the truth about war as told by the children. They have said that 20 years must elapse before these naive direct responses of school children should be revealed to the adult intelligence. This was in the hope that 20 years would dull the vividness of the adults' own war memories and thus render them less responsive to the attitudes and feelings of the children.

The study is of especial significance for two reasons. *First*, it was carried out during the time of the foreign occupation of the territory in which the children lived and while a state of war still existed. *Second*, it was carried out in a thoroughly careful objective manner by a trained psychologist, so that the results are reliable and represent data that can justly be said to reveal the responses of children to war conditions. The trend of the future will be determined by the children who experienced the events and held the sentiments described in this report and by millions of other children of more or less like experience. Studies like this show the emotional drives behind their acts and attitudes. Also an insight into the real progress

that has been made towards international good will can be gained by contrasting the friendly spirit of the elementary schools of many European countries today with the attitudes expressed by these Polish children during the war.

There were many difficulties to overcome before official permission could be secured to investigate the attitudes of the pupils in the schools. Even then school principals and teachers were very suspicious. "Someone might be told about it and then it could go very hard with us and with you, too," said one principal; while another felt that such an investigation was "entirely improper during such a time" and stopped it in the midst of a question. Even the children were afraid to take part at first. "Are you perhaps a German?" "Will the Germans be told about it?" "Are you a German secret service agent?" "Won't they arrest us?" and similar questions greeted the examiner in a boisterous confusion when she tried to explain the nature of the questions she would ask. But in one school a thirteen year old girl displayed a different spirit when she exclaimed in a haughty tone, "It is all the same to me whether the Germans see the papers or not. Let them find out what people really think of them."

In order to secure conditions that would give valid returns despite the doubts and suspicions described, three conditions were always insisted upon: (1) That the children should know nothing of the visit or its purpose until it actually took place; (2) that the papers should be anonymous; and (3) that the teacher should not remain in the room during the inquiry. The first condition was necessary lest the children be warned as to the nature of the responses that they should make. The second was necessary so that each child could feel absolutely free to give his attitudes or feelings without fear of personal consequences. The third was necessary because the teacher by a word, a look, or a change of expression might influence the replies of the children despite all efforts to prevent it. The children also gave a freer expression of their personal views because the teacher was absent, especially when the teacher differed in race from the majority of the pupils.

The experimenter secured a sympathetic *rapport* with the children in each case before presenting the questions. In general this was done by answering the questions of the children frankly, telling them that as a Pole the experimenter would be very interested to know what the children really thought about war matters and promising

them that no German in Warsaw would be permitted to read the papers. Usually the children responded very well to such direct and friendly approach, losing both fear and self-consciousness and becoming anxious to please. Care was taken not to make any statements or suggestions bearing directly or indirectly upon the questions to be asked.

Each child was provided with a sheet of paper, pen, and ink, and was asked to write just what he thought in response to the following questions:

1. Do you know why this war is being waged?
2. Are things better or worse for you during the war? Why?
3. What event of the war has made the strongest impression upon you?
4. What have you wished most during the war?
5. Have you played war?
6. What do you wish for your enemies?
7. Do you wish the war to be ended? Why?
8. Make a drawing of what you think of in connection with the war.

Children were tested in eight schools that can be classified as follows: Four for boys and four for girls; four Christian schools and four Jewish schools; two schools for children of rich parents, three schools for children of middle-class parents, and three schools for children of poor parents. The total number of children turning in papers was 700, of which 360 were boys and 340 girls. They were distributed between the ages of 7 and 16 years.

A careful statistical analysis of the responses of the children will be published later. The replies as presented here are descriptive of the attitudes that were held by the children toward various elements of the war situation and reveal especially the situations or events in connection with which emotional values were the strongest. Answers to only two questions will be treated in this report, leaving the others to a more complete work. No. 3 and No. 6 have been chosen because they tell in briefest fashion the story of the intense emotional experiences of children during the war time and hint at the consequences in terms of national or racial prejudices and antipathies. In each case is given as literal a translation of the response of the child as will carry the meaning. In most cases there is no room for doubt as to the intent of the reply and, in general, only those will be quoted that represent types of responses found a number of times.

In response to the question: "What event of the war has made the strongest impression upon you?" 188 replied in more or less general

terms that the evacuation of Warsaw by the Russians with the attendant blowing up of bridges and the immediate occupation of the city by the German troops had impressed them most. The following quotations show in more detail what this experience meant to the children. One 13 year old girl replied: "The entry of the Germans into Warsaw made the greatest impression upon me. Never will I forget that dreadful night from the 4th to the 5th of August. The whole night I sat at the window and listened to the thunder of cannon. In the morning I heard an earth shaking report, the window sash rattled, and little sister woke up crying. Then came the blowing up of the second and third bridges. As soon as it was light I went out on the balcony and looked out on the empty streets. Suddenly I saw ranks of soldiers marching along Zelna Street, that crosses our street. 'Those are surely the Russians,' said Mother. But a presentiment gripped me. 'Those are Germans, Mama,' I said. I brought the telescope and began to look at the soldiers. I recognized the German helmets. Emotion seized me. Suddenly the servant girl, pale, rushed into the room. 'Madame, the Germans are in Warsaw, my fiance is no longer in Warsaw,' and she began to sob. An hour later Papa came and confirmed the words of the servant girl as he told the happenings. A day with such impressions will always stay in the memory."

A 10 year old girl responded: "The greatest impression was made on me by the blowing up of the bridges and when I saw for the first time the Germans with the terrible lances."

Many of the children felt an expectancy of something terrible when the Germans entered because of stories of earlier war outrages that they had heard. So an 11 year old boy wrote: "When the Germans entered Warsaw I had a very great terror of them because I pictured them to myself as giants and bad men. I was scarcely seven years old then and understood not at all why I was afraid."

A 14 year old girl wrote as follows: "The entrance of the Germans made the greatest impression upon me because I feared them very much and imagined terrible things. I based my conjectures on the German way of acting in Kalisch, that I knew about from the papers and other stories of eye-witnesses."

The older children did not write as much about fear of the Germans as of a presentiment of the evil that awaited the country from then on. So a 14 year old girl wrote: "The entry of the Germans made the greatest impression on me. The enemy soldiers filled the streets of

the city, many women fainted when they realized our situation under the Germans." The following comes from a 12 year old girl: "The entry of the Germans into Warsaw made the greatest impression on me because Poland, freed from the Russian yoke, would not be free but would go into the slavery of the oppressing Germans."

The second greatest number of responses dealt with the circumstances arising from the entry of the Germans. One 13 year boy says: "When the Germans came to Warsaw, and then each day the airships flew and threw bombs on the whole of Warsaw and one could not go on the streets." Another child, a 12 year old girl, wrote: "Once, it was during the Russian time, when the Germans had bombarded Warsaw, I was sleeping in a comfortable bed without knowing anything when suddenly huk! huk! huk! a bomb fell in the second yard where we lived and broke all the windows in the whole house, killed people and I lay senseless on the floor where the explosion of the bomb threw me. That made the greatest impression on me and all the others." From an 11 year old boy the following response came: "It made a fearful impression on me when a shrapnel struck me in the eye and I was amazed when it killed my comrade with whom I was going to church." Another response from a 13 year old girl says in effect: "When the Germans came to Warsaw the zeppelins appeared in the air and threw bombs. One bomb like that fell in our yard, blew in the windowsash at a neighbor's and killed two children, and the neighbor was wounded."

As the Germans approached, many dwellers in the smaller towns fled to Warsaw to escape being on the battlefield. This flight frequently touched the children as is apparent by the following replies:

12 year old girl: "It made the greatest impression on me that they drove the homeless out of the towns, the little children died and the people died like flies."

13 year old girl: "Many happenings during the war impressed me but these stirred me to the heart. One day I visited an asylum for the homeless. What a sight struck my eyes. Groans, crying, soft sobbing, suffering, everywhere death. On the floor in stinking rags sat a woman and held a dying baby in her arms. The woman, looking yearningly in the distance, did not know when the child was drawing its last breath. Suddenly the child threw its arms around its mother's neck, gasped 'Mama' and died. The mother was so chilled that she could say nothing, but shrieked 'God'—and what suffering there was in that word."

12 year old girl: "The flight of the dwellers of little towns to Warsaw made the greatest impression on me. They were driven out of comfort into a strange place without anything and the poor children cried, 'Mama, Papa, let's go back home now, I'm so sick.' My heart was broken by these sights and I wanted to give everything to these poor children."

Many of the children had made such a flight themselves. One 15 year old boy reports: "The greatest impression was made upon me by the flight to Warsaw from the province under the hail of cannon balls and rifle bullets." And an 11 year old boy writes: "that the Russians had driven us out of Poland to Russia. When we went through Russia they stole everything from us. When we were in Russia we believed that there was no hunger here in Warsaw, but here there is still greater hunger than in Russia."

13 year old girl: "The entrance of the Germans made the greatest impression on me because it separated me from my beloved father. My father went to Russia August 1st and news should have come to us. This news never came because of the entrance of the Germans and up until today my father has disappeared without leaving a trace."

Hunger, illness, corpses, and the manner of living were all mentioned many times by the children as the dominating impression of the war days.

16 year old boy: "Standing in line the whole night for one piece of bread."

12 year old girl: "The greatest impression was made on me by standing waiting for potatoes during the night."

13 year old boy: "The murders, robberies, and bandits and the thieves that kill men terribly made the greatest impression on me . . . A great impression was made on me when they blew up the bridge and I saw the dead men on carts with bread and sand and manure."

9 year old boy: "When the Germans came and took horses, cows, and other property."

12 year old girl: "The following made the greatest impression on me—one day when I was in the country our place lay in the line of fire and once the Germans and another time the Russians bombarded our house. At that time I was sitting on the grass in front of the house but luckily I was just moved to another place when a shell struck in that place. I thought to myself, 'How lucky I am that that shell did not strike me. But the poor Poles at the front, they must fight.' "

Not a few children expressed the feeling of their own good fortune in escaping death or serious illness as the strongest impression; the girls expressed compassion very often as has been seen, and the boys seemed to have stronger feelings of resentment. Witness the following:

13 year old boy: "An event of this year delighted me, namely, the murder of a German Commissioner."

14 year old boy: "The greatest impression on me was made by the defeat of the Germans on the French front and then by the murder of Schulz.[1] In the last case the Poles showed that they will permit no foreign rule in their land and no German spies who track the Polish people in secret."

[1] A German secret service agent.

The foregoing gives a qualitative sampling of the experiences related by the children as having made the strongest impression upon them during the war. The significant fact is that every one of them would be accompanied by an unpleasnt emotion. It would be idle to attempt to classify the latter for the descriptions of the children themselves have given a sufficiently vivid picture. More important is the psychological fact that any new elements in these situations have had an exceedingly disagreeable feeling associated with them, such an association as to build up almost inevitably an intense aversion or hate. So the replies to question 6—"What do you wish for your enemies?"—will reveal the natural outcome of such experiences.

One should understand that for these children both Germans and Russians were enemies and, had the investigation been made during the Russian occupation, they would have reacted towards the Russians in the same manner as the following responses show them to have reacted to the Germans. In fact, one of the children said to the experimenter, "We always have a different enemy—it used to be the Russians now it is the Germans." Furthermore, for the Polish children, the Jews who learned in the same room with them are enemies, and for the Jewish children the Poles and Russians were always enemies, but perhaps not the Germans, who were often kind to them in order to gain their sympathy. The important element in each case is that enmity grew up within each group of children toward the other national group or groups that had put difficulties in their way of life, difficulties or troubles that were, as the papers show, very real and very intimate ones in many cases. The following replies should be interpreted, then, not as showing instinctive national animosities that are born in one race or one nation toward another, but rather as the emotionally reenforced reactions of groups of children to the people that were associated very closely with extremely unpleasant experiences, as typical of the reactions that would be made by any group under similar conditions toward any other national group so intimately connected with trouble and sorrow.

Question 6 asked the children: "What do you wish for your enemies?" to which many replied in the spirit of a 12 year old boy who said: "I wish the enemy everything bad," and another who said: "I wish no good to my enemies because they have done so much wrong to our people." Probably the greatest number wished simply as this 11 year old girl who replied: "I wish that the horrible enemy would go away and leave the Fatherland in peace." But with the

wish for peace was almost inevitably a hate of those with whom trouble came and its expression was sometimes bizarre.

12 year old boy: "I wish that the Germans would break their necks and never see their families again."

14 year old boy: "My enemy is the German, I wish for him that he would lose the war, loss of independence and revolution for the government of Germany, and that when they die the devil will have them in Hell."

A number of children made the Kaiser the goal of their especial hate as for example a 15 year old boy: "I wish that they would hang Wilhelm and his minister up high by the feet, burn them on a fire, and that lightning would strike them."

Many answers were frankly revengeful as by a 16 year old boy: "I wish that the enemy would be conquered and enslaved just as they have conquered and enslaved us."

Another group of answers were only curses and malicious wishes.

14 year old boy: "I wish a sudden death to the enemy, to the Germans an everlasting imprisonment."

12 year old girl: "I wish for my enemy that he should fall off of a four-story house—then would Poland be free."

14 year old boy: "I wish for my enemies that they should die of hunger and that they should catch malaria."

15 year old boy: "I wish for my enemies the Germans that no one of them should exist in the world and that all should come to Hell alive."

But in certain schools well-known for their liberal attitudes, where the teachers were against war, and where the children were largely from Socialist homes, the children's wishes showed another trend.

15 year old girl: "I wish that all enemies would have the wish to make peace."

13 year old boy: "I wish for my enemies, that is the Germans, that they would become better."

14 year old boy: "I wish that the enemies would change into friends, I wish that the whole world would be like that so that they would all love each other."

Rather than search among intangible generalities such as the instinct of rivalry, the instinct of pugnacity, or any social instinct to hate or love with the national group to which the children belong, it would seem just to regard the psychological bases for the responses to question 6 as rooted in the disagreeable, emotionally toned experiences related in connection with question 3. That is to say, the Polish children *learned* to hate the Germans as they had previously hated the Russians, because the Germans were occupying their city at a time when the children themselves were experiencing or were seeing others experience the many sorrows, anxieties, illnesses, or even

physical pains that always accompany war situations. Rather than to say that the Poles instinctively hate the Germans, there seems to be ample ground to say that war experiences teach hate, that the presence of foreign soldiery in a country offers many opportunities for the growth of this attitude, and that such was the case in Warsaw. The implication is that any nation will be heated whose troops dominate the situation in a country or district not its own.

The instinct explanation of international or interracial dislike has a wide-spread traditional acceptance. People have said, "It is human nature, and you cannot change human nature." It is recognized that the responses of the children given above do not necessarily prove that this theory is false, but it is axiomatic in science that the simplest and most direct explanations are most likely to be true. Biologists have not proven the inheritance of acquired characteristics, but the efficacy of disagreeable experiences in producing a dislike for the people and things having a relation to these experiences is universally known. It is no matter of surprise, then, that these Polish children should learn to hate the Germans and it is quite unnecessary to add that this hate is a matter of instinct, to be eradicated only with great difficulty. The same could be said of Franco-German hatred. To be sure, this attitude can be passed on in great measure from parent to child, but it will be by social heredity, not biological heredity. It will grow out of a vicarious experiencing by the child of the unhappy situations through which the parent has passed.

The social and educational implications of these two psychological theories as to the basis of international hatred are in sharp contrast with each other. One can see them work out by contrasting the practice in the traditional type of Lycée in France and in the elementary schools of that country. In the first, a mutual hatred of French and Germans is apt to be regarded as instinctive, as "human nature." Hence the professor of history shows his classes the long line of historical events that have resulted from this "natural" dislike and the very direct implication for the future that France must rely upon her own brave citizens to defend herself from the invasions to be expected because "human nature is not likely to change." A strong military force becomes an absolute logical necessity under this theory. In the elementary schools, however, the teachers through their own war experiences have come to a feeling of the utter futility and senselessness of war as a method of settling international disputes. Not being so well grounded in the traditional psychology nor in the traditional

history, and having seen in sharper relief the results of their teaching upon the children, the idea has occurred to them that perhaps education has had quite a part in fostering the warlike spirit and in building up the mutual distrust that has culminated so many times in active hostilities. Determined that this shall not be true in the future and, more than that, with considerable faith in the power of education to develop a spirit of cooperation and international good will, these teachers[1] have set about very energetically to purge the text-books of every word of international hate, of every word of glorification of war and of over-stated patriotism. In their places they are teaching that men of all nations are brothers with common problems to work out. To the first group, the latter attitude appears the height of imbecility in the light of the power of the instincts of rivalry, of combativeness, and of group behavior, to influence human conduct. The second group, however, sees the learning process, with the reenforcing of certain learned tendencies by emotional experiences, as the real determiner of behavior. To them war is not the natural outcome of an instinctive hate, but of a hate kept alive by emotional reenforcement in the schools. Instead of fostering this, the elementary school teachers wish their pupils to learn the truth about war's futility and horror and to develop an active desire to avoid it.

[1] *Bulletin Mensuel du Syndicat National des Institutrices et Instituteurs Publics de France et des Colonies.* May and June, 1926.

THE MENTAL CAPACITY OF SOUTHERN ONTARIO INDIANS[1]

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The discovery of economical and reliable methods of measuring the intelligence and the educational achievement of pupils has placed new weapons in the hands of those who wish to compare the intelligence and achievement of different races. Up to the present, however, few studies of the Indian have been made.

Rowe ('14), using the Goddard Revision of the Binet Scale, measured the intelligence of 268 children in the State of Michigan. He found that only 5.8 per cent of the Indian children tested at or above age, compared with 79 per cent for white children. It is probable that the language handicap was unduly great for Indian children.

Garth ('25), assisted by Serafini and Dutton, tested 1050 full blood Indian children in the United States Indian Schools of Oklahoma and New Mexico, employing the National Intelligence Test, Scale A, Form 1. The median IQ of the United States Indians was found to be 68.6, and only 1.6 per cent of them were found to equal or exceed the median IQ of the whites. As this same test was used in the Ontario study an interesting comparison between American and Canadian Indians can be made.

Fitzgerald and Ludeman ('26) tested 41 Indian children in a mission school in South Dakota and 42 high school Indian children in a training school of Nebraska. They used the National Intelligence and the Terman tests at the mission school and the Otis Test at the training school. The median IQ of 87.5 which was found, is high for Indian children and points to some sort of selection of superior Indian children in these schools.

[1] This summary was written by Sandiford. The investigation was carried out by Jamieson under Sandiford's direction. In the near future Jamieson will publish the detailed results in an extended report. It should be mentioned that Jamieson is an Indian who has resided on the Six Nations Reserve from birth and that he can speak the Mohawk dialect. He is a Master of Arts of McMaster University.

To ascertain whether or not there are differences in the intelligence of Indians of different blood stocks, Garth ('23) administered the National Intelligence Test, Scale A, to 126 Mixed Bloods, 307 Mexicans, 249 Plains and Forest Indians, 176 Pueblo Indians, and 85 Navajo and Apache Indians, the last three groups being full bloods. According to average and median scores as well as percentiles the five groups ranked in the following order, the most intelligent being placed first: (1) Mixed Blood; (2) Mexicans; (3) Plains and Forest Indians; (4) Pueblos; (5) Navajo and Apache. The full-blooded Indians, who use their Indian language more often than English, were probably handicapped by the nature of the tests.

Hunter and Sommermier ('21), using the 1911 edition of the Otis Test with 715 Indians at Haskell Institute, Lawrence, Kansas, report that the median score for the Indians is 82.64 with a standard deviation of 36.7, while the median score of 1366 fifteen-year white children is 122.58, with a standard deviation of 30.9. The quartiles for total score, the median score on each of the ten tests making up the scale, and the percentage of individuals testing at and above the Otis age norms, are found to decrease as the amount of Indian blood increases.

Garth ('22) in another of his many studies of the mental capacity and characteristics of Indian children, formulated the problem: "If groups of mixed and full blood Indians with the same school training as indicated by grade attainment are given the same psychological tests under controlled conditions, what will be the results of a comparison of their performances on the tests?" He sought to answer the question by administering four association tests, three memory tests, and two word-building tests to Indian pupils in the United States Indian school at Chiloco, Oklahoma. He reports that the mixed blood Indians excel the full bloods by about 11 per cent, but that there is considerable overlapping, and that the mixed bloods are favored by superior social status.

In the present study, the subjects investigated were Indian pupils, all of whom were residents of Southern Ontario except eleven Caughnawaga Indians living near Montreal in the Province of Quebec. They were in attendance in the eleven day schools of the Six Nations Schools, in the Mohawk Institute near Brantford, and in the Mount

Elgin Residential School near St. Thomas. The schools of the Six Nations are undenominational day schools—typical rural schools of an Ontario farming community. Both the Mohawk Institute and the Mount Elgin School are residential farm schools, accommodating in preference orphans, children of poor parents and other unfortunates. In addition to a general education the boys of the residential schools receive a practical training in farming and the girls a training in domestic economy.

The inhabitants of the Six Nations Reserve are Iroquois, a confederacy of six tribes, namely, Mohawks, Cayugas, Oneidas, Onondagas, Senecas and Tuscaroras. The Delawares of the southeastern part of the Reserve have been admitted to this confederacy. Not a single member is of pure Indian blood, consequently it is impossible to state the exact proportion of white and Indian in the children. An attempt was made, however, to trace back family histories two generations.

Each tribe has its own dialect. The children's ability in the use and understanding of the different dialects ranges from ability to use and understand several, to inability to use any with complete substitution of the English language. Investigation showed that 45 per cent of the 717 pupils could use an Indian dialect in a conversational way. Many of the remaining 55 per cent could understand to a certain extent although they could not use the dialect. All of them without exception were able to speak the English language, but their ability to use the language freely was undoubtedly lower than that of white children of a corresponding social status.

TABLE I.—MEDIAN CHRONOLOGICAL AGE IN EACH CLASS IN THE DIFFERENT SCHOOLS

School	Class[1]				
	Primer	I	II	III	IV
Ontario (Rural)	7–4	8–8	10–1	11–9	13–9
Six Nations	8–5	10–6	11–1	12–4	14–1
Mohawk Institute	10–4	12–0	11–9	13–7	14–9
Mount Elgin	9–11	12–3	13–2	14–7	16–1

[1] Primer corresponds to Grade I of the American schools; Class I to Grade II; Class II to Grades III and IV; Class III to Grade V and VI; and Class IV to Grades VII and VIII.

These Indian pupils, measured by Chapman's Socio-economic Scale, were found to be much below his standards, the average score being 13 against a norm of 56. They attend school less regularly than the neighboring white pupils, the average attendance in percentage of total enrolment being 63.23 as contrasted with 67.14 for the whites. Age-grade tables show them to be retarded. Table I gives the facts for Ontario and for the Indian Schools.

From what has been said as to the nature of the subjects and their environment, the selection of a series of tests which would be fair to them was a matter of some difficulty. Practically all previous investigators had used tests involving a knowledge of English and the results obtained showed the Indians to be apparently more backward than they really were. The tests finally selected were either of the performance type or of the kind for which comparative material existed in similar studies. The tests and the number of subjects tested are given below:

I.	The National Intelligence Test, Scale A, Form I	289
II.	The Pintner Non-language Mental Test	295
III.	The Pintner-Paterson Scale of Performance Tests—the short scale of 10 tests chosen by Pintner and Spaid	114
IV.	Pintner-Cunningham Primary Mental Test	59
V.	B. C. Test in the Fundamentals of Arithmetic	199
VI.	Ayres Burgess Silent Reading Test	227
VII.	Ayres Spelling Scale (Long's Ontario Standardization)	200
VIII.	B. C. Spelling Test	200
IX.	Writing—Ayres Gettysburg Scale	200

The results are presented here only in the form of summary tables. Full details will be given in the report when it is published.

A. Intelligence Test Results

Table II.—IQ's of Various Groups of Indian Children Obtained by the Use of the N.I.T.

Group	Number tested	Q_1	Q_2 median	Q_3	QD	SD
Six Nations	141	74.0	83.7	93.8	9.9	16.2
Mohawk Institute	65	70.8	76.2	85.9	7.5	12.2
Mount Elgin	69	68.9	77.8	85.8	8.4	13.3
Total	275	71.5	79.8	89.9	9.2	15.0
Grades VII and VIII	94	75.9	85.0	94.4	9.3	13.4
Grades V and VI	103	71.8	80.5	90.6	9.4	14.5
Grades III and IV	78	64.6	74.2	82.8	9.1	15.0
Males	135	70.8	77.8	87.1	8.3	13.9
Females	140	73.0	82.4	92.6	9.8	15.7
Monoglots	153	74.1	82.4	92.4	9.2	14.8
Bilinguals	115	68.9	76.6	86.6	8.9	13.8
Six Nations (Iroquois)	183	....	81.8			
Mohawks (Bay of Quinte)	12	....	79.5			
Chippewas	28	....	77.5			
Oneidas (Thames)	28	....	73.0			
Half-bloods	12	....	85.0			
Three-quarter bloods	17	....	78.0			

As far as can be judged from Table II, the following statements seem to be justified: Indian children tested by the N.I.T. have a median IQ of about 80. This compares with a median IQ for negroes of 75 and of 100 for whites. Only 10 per cent of the Indian children equal or exceed the median IQ of the white children. Residential Indian pupils are duller than day pupils and Indian girls are more intelligent by 4.6 points than Indian boys. Indian pupils who use English exclusively test 5.8 points higher than those who habitually use an Indian dialect. The more white blood the Indian pupils have the higher their intelligence as measured by this test.

TABLE III.—IQ's OF VARIOUS GROUPS OF INDIAN CHILDREN OBTAINED BY USE OF THE PINTNER NON-LANGUAGE MENTAL TEST

Group	Number tested	Q_1	Q_2 median	Q_3	QD	SD
Six Nations	155	86.9	101.0	115.1	14.1	18.0
Mohawk Institute	61	82.9	93.2	104.8	11.0	13.6
Mount Elgin	64	82.1	91.2	102.5	10.2	13.4
Total	280	84.3	96.9	108.7	12.2	17.6
Grades VII and VIII	93	93.0	102.0	111.8	9.7	15.6
Grades V and VI	97	85.5	94.5	107.6	11.1	17.3
Grades III and IV	84	80.4	92.0	106.2	12.9	18.8
Males	142	84.8	97.9	110.5	12.8	16.7
Females	138	83.7	96.1	106.7	11.5	18.3
Monoglots	152	86.8	100.0	110.4	11.8	17.0
Bilinguals	121	81.8	93.6	105.4	11.8	17.7
Six Nations (Iroquois)	202	....	99.3			
Mohawks (Bay of Quinte)	12	....	94.5			
Chippewas	28	....	92.0			
Oneidas (Thames)	23	....	89.0			
Half-bloods	13	....	99.0			
Three-quarter bloods	17	....	99.0			

TABLE IV.—IQ's OF VARIOUS GROUPS OF INDIAN CHILDREN OBTAINED BY USE OF PINTNER-PATERSON SCALE OF PERFORMANCE TESTS (SHORT SCALE)

Group	Number tested	Q_1	Q_2 median	Q_3	QD	SD
Males	51	78.4	89.4	106.2	13.9	21.0
Females	62	76.9	93.6	106.2	15.0	21.0
Total	113	77.7	92.5	106.2	14.3	15.2
Six Nations	41	88.8	102.5	114.4	12.8	21.2
Mohawk Institute	72	72.5	84.6	100.8	14.2	18.6
Monoglots	80	76.0	90.8	106.5	15.2	18.2
Bilinguals	30	82.5	96.0	104.4	10.9	22.9

TABLE V.—IQ's OF VARIOUS GROUPS OF INDIAN CHILDREN OBTAINED BY USE OF THE PINTNER-CUNNINGHAM PRIMARY MENTAL TEST

Group	Number tested	Median IQ
Six Nations Schools	18	90.5
Mohawk Institute	19	80
Mount Elgin	22	66.5
Total	59	77.9
Males	24	78.3
Females	35	77.5
Monoglots	33	80.5
Bilinguals	23	68.1

If the results from the three Pintner Tests are now considered we find that they tell a different tale. Indian children on the non-language test are only 3 points inferior to normal white children, the monoglots, indeed, equalling the performance of other English-speaking children. On the performance test Indian children are slightly more inferior, being 7.5 points below the whites. Younger Indian children marking the pictures of the Pintner-Cunningham Primary Mental Test are given directions in English. The low median IQ of 77.9 is to be attributed in part to the handicap of language.

How do Ontario Indians compare with Indians found elsewhere and with other races? Combining Garth's ('25) findings with those for Ontario we obtain the following comparative results:

Groups	Number of cases	Median scores
12 *and* 13 *years*		
Mixed Bloods	15	103
Mexicans	145	85
Ontario Indians	103	80
Plains and Forest	8	76
Pueblo	46	64
Navajo and Apache	12	52
14 *and* 15 *years*		
Mixed Bloods	30	110
Ontario Indians	83	92
Mexicans	132	92
Plains and Forest	55	85
Pueblo	82	80
Navajo and Apache	19	60

On the same National Intelligence Test the 1050 cases of the United States Indians gave a median IQ of 68.6, while the 275 cases of Ontario Indians gave a median IQ of 79.8.

Comparing Indians and Chinese we find that on the same Pintner Non-language Mental Test the following scores were made:

	Average IQ
513 Chinese children in Hawaii (Symonds)	99.3
280 Ontario Indian children	97.7

With the Pintner-Paterson Scale of Performance Tests (Short Scale) the following comparisons can be made:

	Median IQ
274 Japanese pupils in Vancouver (Sandiford)	98.8
224 Chinese pupils in Vancouver (Sandiford)	88.8
113 Ontario Indian children	92.5

Sheldon's ('24) table of the comparative intelligence of races, constructed from data in the papers of a number of investigators, remains to be mentioned. The following list shows his ranking of races on a scale of intelligence:

Nationality	Average IQ
American	100
English	100
Hebrew	98
Chinese	90
Mexican (American)	85
Indian (American)	83
Slavish	83
Italians	77
Negroes	75

The place to be assigned to the Indians of Ontario in the above array depends upon the test on which their intelligence is to be judged. If either the Pintner Non-language Mental Test or the Pintner-Paterson Scale of Performance Tests (short scale) is the basis, they would occupy a point just below the Hebrews and above the Chinese. If they are ranked on the National Intelligence Test, their rank would be a little below the rank given to American Indians in Sheldon's table. The Chinese would also occupy a higher rank if judged by the

Pintner Non-language Test. Perhaps there would be a general shifting of all the races as a result of using different tests.

B. Achievement Test Results

Table VI.—The British Columbia Test in the Fundamentals of Arithmetic

The B. C. Test in the Fundamentals of Arithmetic; Median Scores in British Columbia Rural Schools, Six Nations Schools, and the Mohawk Institute

Grade	B. C.	Six Nations	Mohawk Institute
III	22.7		
IV	38.7		
III and IV	....	28.1	
V	44.4		
VI	53.3		
V and VI	....	34.5	37.9
VII	59.4		
VIII	68.7		
VII and VIII	....	52.2	47.9

As in general intelligence, the Indians are found to be below the level of white pupils. In their ability to perform the fundamental operations of arithmetic, Indian pupils of a given grade obtain results that are approximately equal to those obtained by white pupils who are classed one grade lower.

Table VII.—Ayres Burgess Silent Reading

Comparison of the Median Credits in the United States, in British Columbia Rural Schools, in Six Nations Day Schools, and in the Mohawk Institute

Grade	U. S.	B. C.	Six Nations	Mohawk Institute
III	50	37.9		
IV	50	39.5		
III and IV	..	....	26.0	20.0
V	50	40.5		
VI	50			
V and VI	..	....	37.8	33.7
VII	50			
VIII	50			
VII and VIII	..	....	31.5	23.3

Canadian records fall below the standards in silent reading set for the U. S. The Indians of Ontario are far below the rural whites of B. C.

TABLE VIII.—THE AYRES SPELLING SCALE (LIST 0)

Average Percentage of Correct Spellings in the United States, Ontario, Six Nations Schools, and the Mohawk Institute

Grade	U. S.	Ont.	Six Nations	Mohawk Institute
III	50	57		
IV	73	70		
III and IV	..	..	49	
V	84	85		
VI	92	91		
V and VI	..	..	75	71
VII	96	96		
VIII	99	98		
VII and VIII	..	..	91	83

TABLE IX.—THE BRITISH COLUMBIA SPELLING TEST

Percentages of Correct Spellings in the United States, British Columbia, Six Nations Schools, and the Mohawk Institute

Grade	U. S.	B. C.	Six Nations	Mohawk Institute
III	73	85		
IV	73	81		
III and IV	..	..	50	
V	73	81		
VI	73	86		
V and VI	..	..	47	45
VII	73	82		
VIII	73	87		
VII and VIII	..	..	61	42

Although the spelling ability of Canadian children as a whole tends to be superior to the standards found for the U. S. this superiority does not extend to Ontario Indian children. The day school Indian children spell better than the institutional children, probably due in part to a superior mentality and partly to more extended teaching. It must be remembered that the Institute children spend half their time in farming or domestic economy of a very practical nature.

TABLE X.—THE AYRES GETTYSBURG WRITING SCALE

Norms and Medians for the United States, British Columbia, British Columbia Rural Schools, Six Nations Schools, and the Mohawk Institute

Grade	U. S.	B. C.	B. C. rural	Six Nations	Mohawk Institute
III	42	48.6	48.3		
IV	46	53.3	52.0		
III and IV	..	....	....	30.2	
V	50	58.9	56.2		
VI	54	62.8	61.7		
V and VI	..	....	....	42.3	33.6
VII	58	62.9	62.0		
VIII	62	66.0	65.8		
VII and VIII	..	....	....	51.7	43.9

The comments regarding spelling apply *mutatis mutandis* for writing. Indian children make records that are two years (or grades) below those of corresponding whites.

C. EDUCATIONAL AND ACHIEVEMENT QUOTIENTS

In this summary only the Educational Quotients (EQ) and the Accomplishment Quotients (AQ) in composites of scores in Reading, Writing, Spelling and Arithmetic will be given, since to print even the condensed tables for each subject would take up too much space. The trend shown by the composites is the trend shown by each subject, the Indian pupils being generally below the corresponding whites.

TABLE XI.—SUMMARY OF EDUCATIONAL QUOTIENTS IN COMPOSITES OF SCORES IN READING, WRITING, SPELLING AND ARITHMETIC OF INDIAN PUPILS IN THE SIX NATIONS DAY SCHOOLS AND THE MOHAWK INSTITUTE

Grade	Number of cases	Q_1	Q_2 median	Q_3	QD
Six Nations					
III and IV	37	69.5	80.4	89.6	10.1
V and VI	48	72.8	83.0	93.3	10.3
VII and VIII	52	74.2	85.0	96.7	11.2
Mohawk Institute					
V and VI	22	64.2	72.5	78.8	7.3
VII and VIII	27	73.1	78.2	83.5	5.2

TABLE XII.—SUMMARY OF ACCOMPLISHMENT QUOTIENTS IN COMPOSITES OF SCORES IN READING, WRITING, SPELLING AND ARITHMETIC OF INDIAN PUPILS IN THE SIX NATIONS DAY SCHOOLS AND THE MOHAWK INSTITUTE. THE AQ'S ARE COMPUTED ON THE BASIS OF THE NATIONAL INTELLIGENCE TEST MENTAL AGES, AND ALSO ON THE BASIS OF PINTNER NON-LANGUAGE TEST MENTAL AGES

Grade	Number of cases	Q_1	Q_2 median	Q_3	QD
Six Nations Schools					
Based on N.I.T. mental ages					
III and IV	21	92.1	99.9	104.7	6.3
V and VI	30	85.6	94.0	103.1	8.7
VII and VIII	36	89.3	96.7	103.7	7.2
Based on P.N.L.T.					
III and IV	23	68.4	78.7	95.4	13.5
V and VI	30	68.1	78.7	89.2	10.5
VII and VIII	35	74.1	81.5	87.4	6.6
Mohawk Institute					
Based on N.I.T.					
V and VI	20	85.0	91.0	96.7	5.8
VII and VIII	21	91.4	94.7	99.0	3.8
Based on P.N.L.T.					
V and VI	16	76.7	80.0	88.3	5.8
VII and VIII	21	70.8	74.1	79.7	4.5

Tables XI and XII show that the Indian children are not only doing work below the level of their chronological ages, but also below the level of their mental ages. Less than one-third of the pupils are working up to, or above, the level of their mental capacities. Besides a possible handicap due to an actual lower level of mental capacity, the language handicap, irregularity of attendance, inferior social status and lack of heterogeneity in the environment which goes along with inferior social status, must be considered as three of the most important factors which have resulted in the inferior performances of the Indian children on the intelligence and the achievement tests. Whether or not the performances would be improved if the environmental handicaps were removed is a question for further study.

SUMMARY

1. The language environment of the children tested is very complex. Although all of the Indian children tested had a knowledge of

English, it is certain that every one of them suffered from a language handicap.

2. Not one of the subjects was of pure Indian blood, but the amount of interfusion of alien blood is indeterminable.

3. The social status of the subjects is generally lower than that of whites. School attendance is more irregular than that of white children and the amount of retardation is greater than that found in nearby rural white schools.

4. The median IQ of Indian children depends on the kind of test used. The median IQ's of all the Indian subjects according to the kind of test used are as follows:

National Intelligence Test	80
Pintner Non-language Mental Test	97
Pintner-Paterson Scale of Performance Tests	92
Pintner-Cunningham Primary Mental Test	78

The above results point to a severe language handicap on the verbal tests.

5. Indian pupils in regular day schools test higher than institutional pupils as the median IQ's show.

	N.I.T.	P.N.L.T.	P.P.S.P.T.	P.C.P.M.T.
Six Nations Schools	84	101	102.5	90
Mohawk Institute	76	93	85	80
Mount Elgin	78	91	.....	66

6. The females may be said to surpass the males on the whole but the difference in median IQ's is not marked.

	N.I.T.	P.N.L.T.	P.P.S.P.T.	P.C.P.M.T.
Males	78	98	89	78
Females	82	96	94	77

7. The monoglots surpass the bilinguals in all tests except the Pintner-Paterson Scale of Performance Tests.

8. The IQ seems to rise with the admixture of white blood, but the results must be interpreted with caution owing to the fact that the numbers of half-bloods and three-quarter bloods are few and

also because the amount of white blood cannot be determined with accuracy.

9. The intelligence ranking of Indian subjects depends on the kind of intelligence test used. Indians rank low on the N.I.T. The use of a non-language test raises their ranking considerably. Racial median IQ's are given below:

Race	N.I.T.	P.N.L.T.	P.P.S.P.T.	P.C.P.M.T.
White children	100	100	100	100
Negroes	75			
Japanese	...	...	99	
Chinese	...	99	89	
Ontario Indians	80	97	92	78
Indians in Six Nations Schools	84	101	102	90
Indians in Mohawk Institute	76	93	85	80
Indians in Mount Elgin	78	91	...	66

10. Indian pupils do not perform nearly as well as whites on the Ayres-Burgess Silent Reading Test.

11. In writing ability Indian children rank below the whites.

12. In spelling ability Indian pupils rank below the whites. They make their best showing on the Ayres Spelling Scale.

13. The Indian Fourth classes (Grades VII and VIII) have a median score in arithmetic which is less than the median score of Grade VI pupils in British Columbia rural schools.

14. Both educational quotients and accomplishment quotients for Indian pupils are below normal on the average. The AQ's calculated on mental ages from a non-language test are lower than those calculated from the N.I.T.

15. In view of the fact that both the intelligence and achievement tests used are dependent on environmental factors, any deductions from the results must be drawn carefully.

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THE OPINION OF A TEACHER-TRAINING INSTITUTION CONCERNING THE RELATIVE VALUE OF SUBJECT-MATTER IN EDUCATIONAL PSYCHOLOGY TO THE ELEMENTARY SCHOOL TEACHER

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Since the field of educational psychology has become so extensive, there is much discussion at the present time concerning what materials shall be selected for courses in educational psychology. The course-time which the teacher in training can give to educational psychology is limited, and therefore it is necessary that the subject-matter presented be the most valuable selection from the entire field.

In a recent study by Goodwin B. Watson of Teachers College, Columbia University, an effort has been made toward evaluating the subject-matter in the general field of educational psychology. Watson constructed a questionnaire in which all of the materials commonly included in courses in educational psychology were arranged under 15 heads. This questionnaire was presented to a group of experts in the training of educators, a group of experienced teachers, supervisors and administrators, and a group of intelligent undergraduates, all found in the faculty and student body of Teachers College. Each person was asked to rate the general items according as he felt the subject-matter important in the business of education.[1]

The present study is concerned with a similar problem. Whereas Watson attempted to evaluate the different divisions of the general field of educational psychology in the light of their importance in the business of education, the purpose of the present study is to select from the entire field that subject-matter most important to the elementary school teacher. The majority of students in undergraduate schools for the training of teachers leave the college after two years of training with certificates to teach in the elementary grades. It is obvious that in this brief period of time these students can obtain only a smattering of the great general body of educational knowledge. Generally they have time to take only one course in educational psychology. It is extremely important, therefore, that the material presented to them in this one course be directly applicable to the teaching problems they will meet in the elementary grades, and because

of the brevity of the time allowed, that it contain only essential material. The writer proposes to attack the problem of the selection of this material from two angles: (1) To what extent do specialists agree on a selection of psychological materials to be presented to the elementary school teacher? (2) To what extent does this professional knowledge correlate with teaching success. Identical materials are used for both attacks. The difficulty of the second attack is increased by our present lack of adequate criteria concerning what constitutes professional success. The results from the first attack only will be presented in this article.

The materials of educational psychology to be presented to elementary school teachers have been selected in the past largely by specialists in psychology. Would it not be well, however, to obtain the opinion of specialists in other fields connected with the training of teachers, and to determine whether there is an agreement among specialists in the various fields of teacher-training concerning the relative importance of different psychological materials to the success of the elementary school teacher?

For two reasons the writer has arranged his material under the 15 divisions of the entire field of educational psychology drawn up by Watson and Spence.[2] In the first place, these 15 divisions, although overlapping to some extent, classify the materials of the subject very well. In the second place the writer desires to compare his results with those obtained by Watson. The form of the material used in this study, however, is very different from the study referred to. Whereas Watson's questionnaire is in the form of an outline of all the materials of educational psychology under 15 problem heads, the present questionnaire takes the form of an objective examination of 75 true-false and 75 multiple choice statements. There are five true-false and five multiple-choice statements on each of the following 15 topics: (1) Problems of Original Nature, Heredity and Environment; (2) Problems of Personality Adjustment for Teachers and Pupils; (3) What are the Outstanding Interests of Children at Different Ages? How Can These Best Be Related to Education? (4) Problems of General Teaching Method; (5) Problems of Teaching Methods for Special Subjects; (6) Problems Involved in Selecting Curricula and Texts; (7) Problems in the Development of Skills; (8) Problems of Measurement; (9) Individual and Group Differences; (10) Problems Involving Extra-curricular Activities; (11) Problems of Inter-relationships and Transfer of Training; (12) Problems Relating to the Home

as an Educational Institution; (13) Problems Involved in Dealing with Adults; (14) Problems of the Interaction of Physical and Psychological Factors; (15) Problems Involving Psychological Schools and Theories.[3] In the ten test statements under each of the above divisions an effort was made to cover the representative material of that division, especially the material which Watson outlines under the division. No two statements attack identical problems, but an effort was made in the ten statements to touch the main problems of the division.

These 150 statements of psychological material, divided in two parts—75 true-false statements in one part and 75 multiple-choice statements in the other—were arranged in cycles of 15, each cycle containing one statement on each of the 15 divisions. Following is a selection from the questionnaire showing the cycle arrangement. The numbers from 1 to 15 opposite the statements indicate the division under which the statement comes.

TRUE-FALSE

1. Motivation in learning should be based largely on instinctive drives.
2. Faulty behavior of children is always due to the blocking of instinctive urges.
3. Unless the worker is successful in his task, no lasting interest will be attached to it.
4. The best results can be attained by the learner when he follows his own natural methods.
5. It is good educational practice in teaching spelling to have children study only those words which they cannot spell as determined by a preliminary test.
6. The curriculum should reflect the interests and purposes of the social life which it desires to promote.
7. The art of writing is learned by exercising a very large number of very minute, specific reactions and training them by use.
8. If half the class exceeds the median, the teaching is evidently successful.
9. When pupils are grouped homogeneously, the brighter pupils are deprived of the opportunities of developing qualities of leadership.
10. All individuals of the school system should be given an opportunity to express themselves in extra-curricular activities.
11. The most effective method of developing honesty in a child is to find that particular school subject or activity which most demands honesty and to rely upon that special subject or activity to develop honesty.
12. The neurotic condition of many adults can be traced back to improper home environment during the pre-school years.
13. The teacher should attend at some time all of the churches but should not join any one for fear of being accused of being partial to those of her pupils who belong to that particular church.

14. Mental fatigue increases during the school day to the extent that pupils are markedly less efficient in the late afternoon than in the morning.

15. Most psychologists are agreed that imitation is a specific instinct.

MULTIPLE-CHOICE

1. Behavior traits to be considered of least importance in the education of the child are (1) reflexes, (2) instincts, (3) pugnacity, (4) fear.

2. The most effective way of eliminating undesirable instinctive reactions is to (1) remove cause of reaction, (2) punish the child, (3) provide a desirable substitute, (4) ignore the reaction.

3. The pupil's interest in any subject can be best aroused by: (1) challenging him with work just beyond his ability, (2) giving him work he can do easily and well, (3) talks from the teacher about the subject, (2) relating the task to instinctive drives.

4. One of the most important bonds to have the child form in his elementary school career is (1) to memorize by wholes rather than by parts, (2) to criticize his own work, (3) to spend approximately an equal amount of time on all functions, (4) to overlearn all functions.

5. The first and natural step in teaching reading is to tell the child that (1) the letters make up words, (2) the black marks or symbols have meaning, (3) the words make up phrases and sentences, (4) reading is necessary for learning other school functions.

6. Arithmetic texts should be selected primarily in terms of (1) mechanical construction of book, (2) logical arrangement of book, (3) practical nature of subject-matter, (4) the degree to which the book interests the children.

7. A total time of 120 minutes will result in most effective learning when distributed in which one of the following four ways: (1) 20 minutes once a day for six days, (2) 10 minutes twice a day for six days, (3) 40 minutes every other day for three days, (4) 120 minutes all at one sitting.

8. The measure which gives the best index of the degree to which a pupil is working educationally up to his intellectual possibilities is (1) educational age, (2) accomplishment quotient, (3) intelligence quotient, (4) educational quotient.

9. Children should be promoted from kindergarten to first grade according to their (1) physical ability, (2) mental age, (3) intelligence quotient, (4) chronological age.

10. The primary function of school entertainment should be (1) to raise money for school purposes, (2) to show the parents what the children are able to do, (3) to provide the children with a legitimate opportunity of "showing-off," (4) to bring about a fuller development of the child.

11. The school subject in the elementary school curriculum having greatest transfer to life situations is (1) writing, (2) arithmetic, (3) spelling, (4) reading.

12. The influence which the home has on its children can be best judged by (1) the social economic status of the children, (2) the attendance records of the children, (3) the scholastic records of the children, (4) the habits of self-control and adjustment which the children possess.

13. If parents, though financially able, refuse to provide glasses for a child suffering from eye strain, the best procedure of the following for the teacher to

take is (1) to try to shame the parents into getting glasses for their child, (2) to refuse to allow the child to come to school, (3) to refer the matter to the principal or superintendent, (4) to try by indirect means such as parent-teacher associations to educate the parents.

14. Children suffering from eye strain evidence most markedly (1) dullness, (2) nervousness, (3) close attention, (4) inattention.

15. The exponent of the two factor theory of intelligence is (1) Terman, (2) Spearman, (3) Judd, (4) Woodworth.

No headings were given in the questionnaire, and no divisions between cycles indicated. The scope and arrangement of the material being thus concealed, it was felt that there would be more likelihood of the rater considering each statement independent of its relation to a general topic. Questionnaires were presented to the faculty of Colorado State Teachers College at Greeley, and to ten superior students in each department. The directions were as follows:

Place a *G* (Good) in the parenthesis at the left of the statement if you feel that the knowledge necessary to correctly answer that statement is very important for the elementary school teacher to possess. Place an *M* (Medium) in the parenthesis at the left of the statement if you feel that the knowledge necessary to correctly answer the statement is important but not essential for the elementary school teacher to possess. Place a *P* (Poor) in the parenthesis at the left of the statement if you feel that the knowledge necessary to answer the statement is unimportant for the elementary school teacher to possess.

Instead of placing evaluations on 15 general topics, the raters gave independent reactions to each of the 150 statements. It would have been very difficult for them to have rated the 150 statements on a scale of 10 as was done on Watson's questionnaire of 15 general topics. A preliminary testing of the 150 statements indicated that ranking on a scale of more than three led to confusion.

The writer feels that the form of this questionnaire has the following advantages over that employed by Watson. There is an equal amount of material on each of the 15 topics which is not the case in Watson's questionnaire. Due to the definiteness of the material, there is very little overlapping between divisions. Because of the fact that the material is not arranged according to headings, the rater is not influenced, in the grading of a particular detail of the topic, by any general aspect of the problem. The material is definite and objective; there is less ambiguity as to the meaning or scope of a particular statement.

These 15 divisions and the material which comes under them, as outlined by Watson, have been criticised by the department of education of this institution as containing subject-matter which, although essential to the training of the elementary school teacher, is being presented and properly belongs in courses in education rather than in psychology. The answer to this criticism is that this material, whether presented in courses designated as educational psychology or not, is psychological subject-matter. Watson writes concerning the formulating of his questionnaire: "Each topic which has been included in texts, courses, and examinations in educational psychology in common use, was challenged with the question, 'What difference does this make in the business of education?' The resulting specific questions were grouped under 15 general topics, with some additional illustrations."[4] It is obvious, however, that in a graduate school such as Teachers College, departments are more highly specialized and overlap less than in an undergraduate school, and much psychological material for which no definite course is provided in an undergraduate school interfuses with general educational material. The distinction between materials offered in elementary courses is, however, another problem. The question we are concerned with is: "What psychological material, whether so designated or not, is essential to the training of the elementary school teacher?"

From the total number of questionnaires submitted to faculty and students, results were available from 67 members of the faculty, and 88 students. As each of the 15 divisions called for 10 separate reactions, the total number of reactions on each division was 880 for students and 670 for faculty.

The data thus obtained were treated as follows: The ratings of both faculty and students were tabulated by departments, showing the total number of good, medium and poor ratings assigned to each of the 150 statements. The ratings assigned to all statements were then combined into a total for each division. In order to combine the three ratings into a single score, an arbitrary weighting of 3 was given to ratings of *good*, 2 to ratings of *medium*, and 1 to ratings of *poor*. Inasmuch as the different departments were unequally represented with respect to the number of individuals reacting, it was necessary to reduce all composite scores to a percentage basis. A table showing per cent evaluations with the corresponding ranks assigned by faculty and students to each of the 15 divisions of subject-matter was constructed by the writer but proved to be too lengthy for publication

in this article.* The range of percentages was from 42 to 98 inclusive, with considerable piling up at the upper end. This piling up was probably due to the fact that all statements, with the possible exception of those coming under division 15, related more or less directly to educational situations, and thus were considered as having intrinsic value. This table showed also a close agreement between the faculty and students within each department.

TABLE I.—THE AVERAGE RANK ASSIGNED TO EACH DIVISION AND A COMPARISON WITH WATSON'S RESULTS

	Faculty	Students	Difference	Psychologists	Watson[5]	
					General educators	Psychologists
Personality Adjustments	1.0	1.5	.5	2.0	1	3
Teaching Methods	2.0	1.5	.5	7.5	3	7
Special Subjects	3.5	4.5	1.0	1.0	11	6
Development of Skills	3.5	3.0	.5	3.0	15	5
Interests at Different Ages	5.5	7.0	1.5	7.5	6	9
Inter-relationships and Transfer	5.5	9.0	3.5	7.5	7	14
Original Nature	7.0	7.0	0.0	4.5	2	2
Curricula and Texts	8.5	4.5	4.0	11.0	8	12
Physical and Psychological Factors	8.5	7.0	1.0	4.5	12	11
Measurement	10.0	13.5	3.5	7.5	5	1
Adult Relations	11.0	11.0	0.0	12.0	10	10
Individual and Group Differences	12.0	11.0	1.0	10.0	4	4
Home Influences	13.0	11.0	2.0	15.0	13	13
Extra-curricular Activities	14.0	13.5	.5	14.0	15	8
Schools and Theories	15.0	15.0	.0	13.0	14	8

Average difference, 1.3.

* Rank 1 indicated highest value, rank 15 lowest. The percentage values for each department were ranked separately in order to determine the relative importance each department placed on each division. The same percentage values in different departments would not, therefore, receive the same rank. While a department may have rated, on the whole, higher or lower than another department, the relative importance attached to the different divisions was taken care of by the rank method. However, the ranks given to the per cent evaluations did not completely express the true state of affairs, because the difference between the percentage values was not equal, while arbitrarily the difference between ranks representing these percentages was equal.

Table I gives the average rank assigned to each of the divisions of subject-matter. The 15 divisions are listed from highest to lowest in the order of their importance as estimated by the faculty. The corresponding student ratings given in this table show that there is considerable agreement between faculty and students in their average ratings, for the average difference between the ranks given to the different divisions is only 1.3. The division on which there is greatest disagreement is that of curricula and texts.

It will be noted from this table that the combined opinion of the faculty places the greatest emphasis upon the items of personality adjustment for teachers and pupils, problems of general teaching method, problems of teaching methods for special subjects, and problems in the development of skills; and the least emphasis upon problems involving psychological schools and theories, problems involving extra-curricular activities, problems relating to the home as an educational institution, individual and group differences, and problems involved in dealing with adults. To compare these results with those of Watson, as indicated on the table, we find that there is an agreement in ranking personality adjustments and general teaching methods high, and in ranking schools and theories, extra-curricular activities, problems involved in dealing with adults, and problems relating to the home as an educational institution low. There is great disagreement upon the importance attached to problems in the development of skills, and problems of teaching methods for special subjects which are rated high in this study and quite low by the general body of educators in Watson's study. It will be noted however, that the psychologists in Watson's study rank the problems of skills and special subjects much higher than do the general body of educators and agree, in general, with the faculty of this institution. On the other hand, individual and group differences stand low in this study and high in Watson's. There seems to be complete disagreement on this topic as the psychologists of both institutions agree in general with their respective faculties. It may be that the nature of the statements caused this low ranking, or that the faculty of this institution considered this material as belonging to the field of school organization rather than to the field of educational psychology. Original nature and measurement also rank considerably lower than was found by Watson, while physiological and psychological factors are ranked slightly higher. The psychologists of this institution, however, rank original nature and measurement higher than do the general faculty, and are closer to the ratings of both the general

body of educators and the psychologists in Watson's study. Since our psychologists agree in general with Watson's results, it occurs to the writer than the faculty of this institution may not be sufficiently aware of the value of a knowledge of original nature, and especially of measurement to the elementary school teacher. Our psychologists seem to feel that a knowledge of the interaction of physical and psychological factors is much more important than do both our general faculty and Watson's educators. The subject-matter which is ranked as having average importance by both studies is as follows: Problems relating to the interests of children at different ages, problems involved in selecting curricula and texts, and problems of inter-relationships and transfer of training. While somewhat different results might have been obtained from another set of 150 statements, the extent to which the results of this study agree with those of Watson is noteworthy when we consider that the material in the present study was in an entirely different form from that of Watson's questionnaire.

Table II shows the extent to which the different departments agree in their ratings of the 15 divisions. The departments are arranged under each heading according to the importance they attach to that division. From the range of ranks indicated on this table, it will be seen that the departments are agreed on the whole that problems of personality adjustments, teaching methods, special subjects and the development of skills are of major importance to the elementary school teacher; that problems of schools and theories, extra-curricular activities, the home as an educational institution, individual and group differences and adult relationships are of minor importance, and that problems involving the selection of curricula and texts are of average importance. The significant fact to be noted from Table II, however, is that there is little or no agreement on the divisions of subject-matter assigned average importance in Table I, namely the divisions relating to interests, inter-relationships and transfer of training, original nature, interaction of physical and psychological factors, and measurement. This disagreement would indicate that the ranks of average importance, obtained by averaging the ranks of the 15 departments on these divisions as indicated in Table I, are misleading and that no conclusions as to the relative importance of these items can be drawn from the results of this study.

In summary, we may say that a study of the opinion of specialists in a teacher-training institution concerning the relative importance

TABLE II.—EXTENT TO WHICH DIFFERENT DEPARTMENTS AGREE IN RATING THE 15 DIVISIONS

I. Problems of Original Nature, Heredity and Environment		II. Problems of Personality Adjustment for Teachers and Pupils	
Biology	1.5	Industrial arts	1.0
English	3.0	English	1.0
Science	4.0	Science	1.0
Psychology	4.5	Music	1.5
Physical education	5.0	Home economics	1.5
History and sociology	6.0	Psychology	2.0
Geology and geography	6.5	History and sociology	2.0
Music	6.5	Romance languages	2.0
Home economics	7.0	Physical education	2.5
Training school	8.5	Geology and geography	2.5
Industrial arts	9.0	Training school	3.0
Education	10.0	Commerce	3.0
Mathematics	11.0	Education	3.5
Romance languages	12.0	Mathematics	4.0
Commerce	13.0	Biology	4.5

III. Interests of Children at Different Ages		IV. Problems of General Teaching Method	
Science	2.5	Music	1.5
Commerce	4.0	Biology	1.5
Music	4.0	Science	2.5
Training school	4.5	Physical education	2.5
Biology	4.5	Mathematics	2.5
Education	5.5	Home economics	3.0
English	5.5	Industrial arts	3.0
Industrial art	7.0	History and sociology	3.0
History and sociology	7.0	Education	3.5
Physical education	7.0	Training school	4.5
Psychology	7.5	Commerce	5.5
Home economics	8.5	Romance languages	6.0
Mathematics	9.0	Psychology	7.5
Geology and geography	9.0	English	8.0
Romance languages	14.0	Geology and geography	10.0

TABLE II.—*Continued*

V. Problems of Teaching Methods for Special Subjects		VI. Problems Involved in Selecting Curricula and Texts	
Psychology	1.0	Romance languages	3.0
Mathematics	1.0	Biology	4.5
Education	1.5	Training school	6.0
Training school	2.0	Home economics	6.0
Home economics	4.0	Music	6.5
History and sociology	4.0	Geology and geography	6.5
Geology and geography	4.0	English	7.0
Biology	4.5	Science	7.0
Physical education	5.0	Mathematics	7.0
Commerce	5.5	Education	8.5
English	5.5	Commerce	8.5
Science	7.0	History	9.0
Romance languages	7.0	Industrial arts	10.0
Music	9.0	Physical education	10.0
Industrial arts	13.0	Psychology	11.0

VII. Problems in the Development of Skills		VIII. Problems of Measurement	
Training school	1.0	Industrial arts	2.0
History and sociology	1.0	Psychology	7.5
Physical education	1.0	Education	8.5
Education	1.5	Commerce	8.5
Commerce	1.5	Romance languages	8.5
Home economics	1.5	Physical education	9.0
English	2.0	History	10.0
Mathematics	2.5	Mathematics	10.0
Psychology	3.0	Biology	11.0
Music	6.5	English	11.0
Geology and geography	6.5	Home economics	12.0
Biology	7.5	Training school	12.5
Romance languages	8.5	Music	13.0
Science	9.5	Science	14.0
Psychology	14.0	Geology	14.0

TABLE II.—*Continued*

IX. Individual and Group Differences		X. Problems Involving Extracurricular Activities	
Romance languages	4.5	Music	6.5
Training school	8.5	Geology	6.5
Commerce	8.5	Commerce	11.0
English	9.5	Science	11.0
Psychology	10.0	Industrial arts	12.0
Home economics	10.0	English	12.5
Music	11.0	Biology	13.0
Industrial arts	11.0	Romance languages	13.0
Physical education	11.0	Mathematics	13.0
Education	11.5	Home economics	13.5
Science	13.0	Psychology	14.0
History and sociology	13.0	Education	14.0
Mathematics	13.0	Training school	14.0
Geology and geography	13.0	History sociology	14.0
Biology	14.0	Physical education	15.0

XI. Problems of Inter-relationships and Transfer of Training		XII. Problems Relating to the Home as an Educational Institution	
Commerce	1.5	Romance languages	1.0
Geology and geography	2.5	Industrial arts	7.0
English	4.0	Commerce	8.5
Science	5.0	Biology	10.0
Home economics	5.0	Home economics	11.0
Education	5.5	Geology and geography	11.5
Mathematics	6.0	Education	11.5
Training school	7.0	History and sociology	12.0
Industrial arts	7.0	Physical education	12.0
Psychology	7.5	Training school	12.5
Biology	7.5	English	12.5
Physical education	8.0	Mathematics	13.0
Romance languages	10.0	Music	14.0
History and sociology	11.0	Psychology	14.0
Music	12.0	Science	15.0

TABLE II.—*Continued.*

XIII. Problems Involved in Dealing with Adults		XIV. Problems of the Interaction of Physical and Psychological Factors	
Geology and geography	1.0	Music	3.0
Industrial arts	4.5	Psychology	4.5
Romance languages	4.5	Industrial arts	4.5
Mathematics	5.0	History	5.0
Science	7.0	Physical education	5.0
History	8.0	Education	7.0
Biology	9.0	Mathematics	8.0
Music	10.0	Home economics	8.5
Training school	10.0	English	9.5
Psychology	12.0	Science	9.5
Education	13.0	Training school	10.5
Physical education	13.0	Romance languages	11.0
Home economics	13.5	Geology	11.5
Commerce	14.0	Biology	12.0
English	14.0	Commerce	12.0

XV. Problems Involving Psychological Schools and Theories

Science	12.0
Psychology	13.0
Physical education	14.0
Education	15.0
Training school	15.0
Music	15.0
Biology	15.0
Commerce	15.0
Home economics	15.0
Industrial arts	15.0
English	15.0
History and sociology	15.0
Romance languages	15.0
Mathematics	15.0
Geology and geography	15.0

of different psychological subject-matter to the elementary school teacher suggests the following conclusions.

1. Problems of Original Nature, Heredity and Environment. The general faculty, considered by departments, do not agree on the rating of this subject. The average rating is lower than that found by Watson in his general evaluation of psychological subject-matter, but the ratings of the department of psychology, considered separately, agree more closely with Watson's results.

2. Problems of Personality Adjustments for Teachers and Pupils. There is general agreement that this subject is of major importance.

3. Problems of the Interests of Children at Different Ages. There is general agreement that this subject is of average importance.

4. Problems of General Teaching Methods. There is general agreement that this subject is of major importance.

5. Problems of Teaching Methods for Special Subjects. The general faculty are agreed that this subject is of major importance. The psychologists in Watson's study agree in general with this rating, but Watson's general body of educators rate this subject as being of distinctly less importance.

6. Problems Involved in Selecting Curricula and Texts. There is general agreement that this subject is of average importance.

7. Problems in the Development of Skills. The general faculty are agreed that this subject is of major importance. The psychologists in Watson's study agree in general with this rating, but Watson's general body of educators rate this subject as having distinctly less value.

8. Problems of Measurement. There is no agreement between the departments of the faculty on the rating of this subject. Average opinion rates this subject lower than the rating obtained by Watson.

9. Individual and Group Differences. The general faculty are agreed that this subject is of minor importance. These conclusions are in complete disagreement with general evaluations obtained by Watson.

10. Problems Involving Extra-curricular Activities. There is general agreement that this subject is of minor importance.

11. Problems of Inter-relationships and Transfer of Training. There is no agreement between the departments of the faculty on the rating of this subject. The average rating of average importance assigned this subject by the general faculty is in agreement with Watson's findings.

12. Problems Relating to the Home as an Educational Institution. There is general agreement that this subject is of minor importance.

13. Problems Involved in Dealing with Adults. There is general agreement that this subject is of minor importance.

14. Problems of the Interaction of Physical and Psychological Factors. There is no agreement between the departments of the faculty on the rating of this subject. The average rating is higher than that obtained by Watson.

15. Problems Involving Psychological Schools and Theories. There is general agreement that this subject is of minor importance.

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1. Watson, Goodwin B.: What Shall Be Taught in Educational Psychology. *Journal of Educational Psychology*, December, 1926, pp. 577–599.
2. *Ibid.*, p. 579.
3. *Ibid.*, pp. 580–586.
4. *Ibid.*, p. 579.
5. *Ibid.*, p. 598.

THE PERMANENCE OF LEARNING IN HIGH SCHOOL SUBJECTS—ALGEBRA

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Obviously one of the most important questions which every teacher faces is: How long will this that I am teaching be remembered? But unfortunately, up to the present time, there is very little evidence on the problem. It is still commonly believed that a very large proportion of the content of the various courses is very quickly forgotten, even though Thorndike[1] and Eikenberry[2] have shown a fairly high degree of retention.

In each of these researches, however, it was found necessary to assume that the content of the subject measured had at one time been known. This is, of course, an unsatisfactory assumption and it is fortunately now possible to get an exact result of retention over a long period for material known to have been learned.

This is a first report of an extended investigation which is under way to determine the amount of specific content of school subjects retained after various periods of time.[3]

The technique is to score objective examination papers item by item, and then after a certain stated period, for example, six months, one year, or two years, to give exactly the same examination to the same pupils, again scoring item by item. It is then possible to say, not only that a certain portion of the whole test has been remembered, but also that such and such an item of information for such and such a pupil was known on a certain date, and is or is not known at the second date. The purpose is to investigate not only the amount retained over various periods of time, but also the amount retained in relation to a person's ability as indicated by the score on intelligence tests; the amount retained in relation to that initially known, and the amount retained subsequent to certain types of teaching and to certain semi-artificial motives, for example, the participation in

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[1] Thorndike, E. L.: "The Psychology of Algebra." Macmillan, pp. 452–457.

[2] Eikenberry, D. H.: The Permanency of High School Learning. *Journal of Educational Psychology*, Vol. XIV, 1923, pp. 463–481.

[3] This investigation will, in the main, be conducted by the writer with the cooperation of Dr. E. R. Wood of Kansas State Teachers College, Emporia, Kansas and of a large number of public school men and graduate students.

scholarship contests. A study will also be made of the particular items of the tests involved to see if certain facts and skills seem, in general, to be retained better than other facts or skills. The following brief report will illustrate some of the technique which is being employed and will indicate the types of results which are being obtained.

How Well Is Algebra Remembered?

Three forms of the Douglas Algebra test were given to a small class in 1927, according to the following schedule: Form A-1 on February 9; Form A-II on March 29; Form B-I on May 17. Then the same tests were again given to the same pupils on December 20 and 21. Forms A-I and A-II are equivalent, while Form B-I covers processes which occur later in the course than those covered by the other forms. It was somewhat startling to discover that 16 of the 22 pupils made on the retest of Form A-I, scores equal to or better than their original scores. Although the instructor reports that no review or training on the original test was given prior to the first use of Form A-II, the fact that the scores on A-II were in almost every case higher than those of A-I indicates that either because of the practice effect or because of new work in algebra which involved the old processes, progress and over-learning was actually being accomplished. This is further evidenced by the fact that only 5 of the 22 pupils made on Form A-II retest scores equal to or better than their first scores.

It seemed well then, remembering that Forms A-I and A-II are equivalent, to investigate the proportion of A-I remembered to the original scores of A-II as well as to study the amount of A-II remembered to its initial score. The average score on the retest of A-I was greater than the original score, the proportion being 1.09 to 1. The proportion remembered on Form A-II to its original score was 84.68, and the proportion remembered on A-I to the original score of A-II was 80.77. This indicates not only a very high degree of retention, but that there is at least some slight generalization of the ability learned.

That the higher amount of retention indicated above is probably due to over-learning is indicated by the result of the retest on Form B-I. This, it is remembered, covers processes which occur relatively late in the course in algebra. While the original scores on this form averaged 41 per cent of the total possible, as compared with Form A-I

whose average original score was 46.75 per cent of the total, the average proportion of the scores on the retest to the original scores was only 34.66 per cent. It seems, then, that the amount of forgetting on this test was immensely more than on the others, even though the time between the tests was less. Only one pupil on the retest of this form equalled his first score. A serious problem, then, is to provide practice sufficient for permanent retention for the content given late in the year, or shall we just "leave off the last car?"

An examination of items shows that in Forms A-I and A-II, many exercises which were missed on the first test were correctly performed on the second, indicating that the method was remembered and that the error on the first test was due merely to improper manipulation. In Form B-I almost no items were rightly performed the second time which were missed in the first. It appears, then, that here we have definite forgetting. Further examination shows that certain items on each test were remembered by nearly 100 per cent of the class, while certain other items were remembered by almost no one of those who did them correctly on the first test. Whether these exercises are intrinsically more difficult or whether they were insufficiently over-learned is yet to be determined. No relation was found between the amount originally known and the amount retained, or between the intelligence rating and proportion of retention of the second test to the first one.

The results of further investigations and a full display of tables will be published at a later date. It may be noted now that other studies in algebra as well as those in plane geometry, home economics, and biology are showing the same trends as the one here reported. It is expected that this investigation will extend over a period of years and it seems evident that results of utmost importance to educational theory and practice are being obtained.

STUDIES OF THE VALIDITY OF THE DEARBORN GENERAL INTELLIGENCE EXAMINATIONS

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It is the purpose of this paper to present briefly the results of some minor validity studies which were carried out with the Dearborn Series I Tests in their original form.

A common method for the study of group intelligence test validity is to make comparisons of the group test results with results of Stanford-Binet Tests given to the same individuals. It is assumed that the Stanford Revision gives accurate measures of intelligence, and that the measures produced by a dependable[1] group test will not vary too greatly from the Stanford mental ages and intelligence quotients. This assumption may be questioned seriously, but it is accepted for the basis of the present report.

Five groups of children were given Dearborn General Examinations 1, 2, and 3 and also the Stanford Revision. Essential facts about these groups are listed below.

Group 1.—Thirteen children in the first three grades of a summer camp school, ranging in chronological age from 8–0 to 10–8, and having Stanford IQ's from 85 to 166. Both group and individual examinations were given to the children of this group by expert examiners.

Group 2.—Twenty-five children under 11 years of age from an ungraded school in a rural district, ranging in chronological age from 6–11 to 10–8, and having Stanford IQ's from 59 to 94. The examining in this group was also done by experts.

Group 3.—Seventeen children from a juvenile detention home. The chronological age range was from 5–2 to 11–9, but nine of the group were 10–0 or more. The Stanford IQ's ranged from 69 to 109, and all the examining was by experts.

Group 4.—Twenty-five Grade I children in a city system. Chronologically, they ranged from 5–4 to 9–1, with Stanford IQ's running from 77 up to 111. This group was examined by an extension class student who was not an expert in either group or individual examining.

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[1] The writer is accustomed to use the term "dependability" as a general term to include reliability and validity. See *American School Board Journal*, Vol. LXX, No. 6, p. 43.

Group 5.—Ten children in a city Grade I, ranging from 5–3 to 10–9 chronologically, and from 76 to 130 in Stanford IQ. The examiner in this group was also inexpert.

In Table I are shown the distributions of differences in the intelligence quotients as obtained from the Stanford and Dearborn examinations, together with the median difference for each distribution. It is interesting to note that in the groups examined by experts the median differences are small, while in the groups examined by untrained individuals the differences are large. It is quite possible that in the latter cases the group test results are more dependable than those obtained from the Stanford examination.

TABLE I.—DIFFERENCES BETWEEN INTELLIGENCE QUOTIENTS OBTAINED FROM THE DEARBORN AND STANFORD EXAMINATIONS

Points	0	1	2	3	4	5	6	7	8	9	10–14	15–19	Over 20	Medium
Expert Examiners														
Group 1.....	1	0	1	3	1	0	2	1	1	0	2	0	1	6.3
Group 2.....	2	1	2	8	1	0	2	2	2	2	1	2	0	3.9
Group 3.....	1	2	2	2	1	1	1	0	0	0	4	2	1	5.5
Total.....	4	3	5	13	3	1	5	3	3	2	7	4	2	4.8
Inexpert Examiners														
Group 4.....	2	0	2	3	3	0	2	0	1	0	4	5	3	8.5
Group 5.....	2	0	0	0	1	0	1	0	0	0	1	2	3	12.5
Total.....	4	0	2	3	4	0	3	0	1	0	5	7	6	10.1

The difference shown in the table may be interpreted more intelligently if it is recalled that studies of the constancy of intelligence quotients on Stanford retests have reported difference ranging from 3 to 9 points.[1]

The writer has previously reported a study of IQ constancy in which were included the children of Group 1 and others from the same school.[2] The median change found in this previous study was 5.25 points, and the upper quartile of the distribution was 11.5 points. Thus it will be seen that the differences between the Dearborn and

[1] Rugg and Colloton: The Constancy of the Stanford-Binet IQ as Shown by Retests. *Journal of Educational Psychology*, Vol. XII, No. 6, p. 315.

[2] Lincoln, E. A.: The Constancy of Intelligence Quotients. *Journal of Educational Psychology*, Vol. XIII, No. 8.

Stanford intelligence quotients are, when both examinations are given by experts, about the same as the difference obtained when the Stanford examination is repeated.

Correlations between the intelligence quotients obtained on the two examinations in the different groups are shown in Table II. Since the groups were small, the correlations were figured by the rank difference method, with the use of the Scott Laboratory tables. The correlation for the combined group of those tested by expert examiners was obtained by the Pearson method from a scatter diagram in which the quotients were grouped in five point intervals.

TABLE II.—CORRELATIONS BETWEEN INTELLIGENCE QUOTIENTS OBTAINED FROM THE DEARBORN AND STANFORD EXAMINATIONS

Group	N	*r*	PE	CA range	Stanford IQ range
1	13	.95	.04	8- 0—10-8	85–166
2	25	.90	.03	6-11—10-8	59–94
3	17	.83	.07	5- 2—11-9	69–109
1 + 2 + 3	55	.85	.03	5- 2—11-9	59–166
4	25	.71	.07	5- 4— 9-1	77–111
5	10	.66	.12	5- 3—10-9	76–130
45	35	.72	.05	5- 3—10-9	76–130

The correlations in the groups which were examined expertly are very satisfactory. The lower correlations in the groups which were not examined by experts again emphasizes the fact that trained examiners are needed for both group and individual intelligence tests.

In connection with the above coefficients it is well to recall the report of Root, who studied the relationship of Stanford results to those obtained from several group tests.[1] In the first three grades combined he obtained a coefficient of .74 between Binet and Haggerty Sigma I; .76 between Binet and Haggerty Delta I; and .79 between Binet and Dearborn Series I. In the first four grades there was a correlation of .80 between Binet and the Otis Primary Examination.

One other minor study may be reported with this group. Thirteen older children in the summer camp school above mentioned were given both Dearborn Series I and Army Alpha by expert examiners. They ranged from 10–3 to 15–4 in chronological age, and so were too

[1] Root, W. T.: Correlations between Binet Tests and Group Tests. *Journal of Educational Psychology*, Vol. XIII, No. 5, p. 286.

old to be accurately measured by Series I, yet the correlation between the Alpha and Series I scores was found to be .83. Seven of the group held exactly the same rank on the two examinations, and two more varied by one rank only.

The question may be asked as to whether the findings of the above studies can be applied to the revised Series I, which is considerably shorter than the old form. It is very likely that they can, for the correlation between the old and the revised forms is .95 when the scores are grouped in five point intervals. However, some studies of the new Series I will be presented in a later discussion.

NOTES ON ARTICLES IN EDUCATIONAL PSYCHOLOGY IN CURRENT ISSUES OF OTHER MAGAZINES

REPORTED BY JAMES E. MENDENHALL

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Intelligence Testing

The Selected Nature of a Particular School Population. Verner Martin Sims. The School Review, Apr., 1928, 296–301. A study of 1018 white pupils in intelligence quotients (Otis SA) and in socio-economic status (Sims Score Card) shows striking differences between Grade V and Grades VI to VIII in a Louisiana parish.

The Intelligence of School Children and Parental Occupation. Journal of Educational Research, Mar., 1928, 157–169. The investigation included 4727 children from 3089 families, Grades I to XII. "The occupation of the father (Barr scale) may be consulted as a rough index to the intelligence of the child." (Otis Group, Primary and Advanced.)

Repeated Thorndike Intelligence Examinations. K. M. Cowdery. School and Society, Mar. 24, 1928, 367–369. Retests of 207 beginning psychology students revealed these results: (1) Correlations vary from .648 after three-year interval to .889 for interval of less than one year (but on repetition of same form), (2) dispersions of scores were somewhat restricted on the second test.

A Study of the Relative Values of the Audito-vocal Forward Memory Span and the Reverse Span as Diagnostic Tests. Selinda McCaulley. The Psychological Clinic, Jan.-Feb., 1928.

A thousand children (*a*) referred to clinic (*b*) most successful in school work and (*c*) least successful in school work (Grades I to VIII) were tested in these two functions. The two conclusions were (1) that the reverse span test is more highly diagnostic than the forward span and (2) that mental development varies directly with the ratio of the reverse span to the forward span.

Mental Tests for Pre-school Children. Dorothy Kern Hallowell. The Psychological Clinic, Jan.-Feb., 1928, 235–264. The results of testing 650 children (ages 1 to 4) on 3 Disc Formboard, 3 Figure Formboard, Witmer Formboard, Pegs A, B, C, D, Color Matching and Memory Span and Binet Test are used to establish norms.

The Relation of Physical Constitution to General Intelligence, Social Intelligence and Emotional Instability. H. E. Garrett and W. N. Kellogg. Journal of Experimental Psychology, Apr. 1928, 113–129. The measurement of 221 Columbia College Freshmen in physical measurements, on the Thorndike Intelligence Examination for High School Graduates, on the Woodworth Personal Data, and on the George Washington Social Intelligence Test. All inter-correlations between tests were low—.055 to .101 except between Height/Weight and Morphological Index, .810; and Thorndike score and Social Intelligence, .420.

Psychology of Learning

A Study of the Learning Curves for Two Systems of Shorthand. Parrish Little Jette. Journal of Experimental Psychology, Apr., 1928, 145–160. Learning curves for progress in Gregg and in Burnz shorthand systems reveal that the influence of practice can be considered negligible after 300 hours and 400 hours respectively.

Educational and Vocational Guidance

The Non-vocational Values of Commercial Education. Frederick J. Weersing. The School Review, Mar., 1928, 213–226. A questionnaire submitted to 230 college students who took commercial subjects revealed that many felt that typewriting, elements of accounts, and general business information were of practical value.

Predictions from High-school Performances. Edward L. Jones. School and Society, Mar. 17, 1928, 339–340. (1) Average grade in high school, (2) position in class, (3) Board of Regents examination grades, (4) college grades, and (5) intelligence tests—the first three ratings correlate equally well with college grades (2 years) .43, .45 and .40 for men and .58, .63 and .70 for women. Intelligence tests (American Council) correlate (*a*) with fourth year high school average .14 (men) and .22 (women) and (*b*) with high school regents average .55 (men) and .45 (women). The fourth year high school index is superior to the four-year average in predicting success in Freshman year for doubtful cases.

How College Students Spend Their Time. Alfred G. Goldsmith and C. C. Crawford. School and Society, Mar. 31, 1928, 399–402. The records of 100 college students for seven consecutive days were tabulated.

Methods of Study

A Survey of Investigations on Study. Maxie N. Woodring and Cecile White Flemming. Teachers College Record, Jan., Feb., Mar., Apr., May, 1928. A complete bibliography and criticism of studies to date.

A Comparative Study of the Effectiveness of Laboratory Exercises in High-school Zoology with and without Drawings. Amer W. Ballow. School and Society, Apr., 1928, 284–295. The construction of representative drawings does not aid the pupil in analyzing study materials or in remembering (either immediately or permanently).

An Experimental Study of Methods of Reviewing the Lesson of the Previous Day. Oscar A. Ullrich. Journal of Educational Research, Mar., 1928, 211–214. No conclusive differences between two college groups of 14 each in elementary educational psychology when in one the summary was made by the instructor and in the other the summary was made by a written question-answer method.

The Experimental Comparison of the Relative Effectiveness of Two Sequences in Supervised Study. Karl Roy Douglass. University of Oregon Publication, Dec., 1927. Two classes (18 pupils each) were practiced over a period of 11 weeks, one in study-recite method, the other in recite-study method. The study-recite method proved slightly superior in the history, English, mathematics and science classes, which were tested objectively.

Studies Bearing on Curricular Materials

What to Expect of the High-school Student in Chemical Formula and Equation Writing. Journal of Chemical Education, Mar., 1928, 304–313. One hundred forty-five instructors in high schools and universities were submitted a questionnaire. The results are presented.

Curricular Gaps. W. C. Ruediger. School and Society, Mar. 2, 1928, 274–278. A study of the subjects omitted and taken by junior, senior and graduate students in high school and college.

A Study of the Voluntary Reading of Pupils in Grades IV–VIII. Thomas J. Lancaster. The Elementary School Journal, Mar., 1928, 525–537. 1793 boys and 2676 girls listed the books which they had read voluntarily during a semester. The returns were analyzed and then compared with those of other similar studies.

Vocabulary Burden. Edward William Dolch. Journal of Educational Research, Mar., 1928, 170–183. A method for evaluating the vocabulary burden of reading books is given.

New Tests

Iowa Silent Reading Examinations. A. N. Jorgensen. Studies in Education, University of Iowa, May 1, 1927. Report of the standardization in Grades VII to XII of a reading test purporting to measure paragraph meaning, subject-matter vocabulary, sentence comprehension and organization, paragraph organization, use of the index, rate of reading, and memory.

New York Latin Achievement Test. Harold G. Thompson and Jacob S. Orleans. World Book Company, 1928. Test 1: Forms A and B, for first half year; Test 2; Forms A and B for second half year.

The Construction and Validation of a French Grammar Test of the Selection or Multiple Choice Type. F. D. Cheydleur. Journal of Educational Research, Mar., 1928, 184–196. A reliability coefficient of .93 was secured on 9664 cases.

An Achievement Test in Solid Geometry. Louis A. McCoy, Mathematics Teacher. Mar., 1928, 151–162. The test was administered to 376 high school boys.

Miscellaneous

Selection of Under-age Children for Entrance into School. Carleton Washburne and Louis Raths. Educational Administration and Supervision, Mar., 1928, 185–188. The 36 under-age children compared favorably with other children, on arithmetic, reading, language, in number of work units accomplished, and on teacher rating of traits.

The Opportunities of Pupils to Participate in the Teacher's Time. The Elementary School Journal, Mar., 1928, 538–543. A record of the number and length of the recitations of 1758 pupils shows that the bright child (*a*) received most of the teacher's time, (*b*) recited more often and for a longer period of time.

Demonstration of the Effect of Unreliability of Measurement on a Difference between Groups. Robert Choate Tryon. The Journal of Comparative Psychology, Feb., 1928, 1–22. A device for determining differences between means is presented.

NEW PUBLICATIONS IN EDUCATIONAL PSYCHOLOGY AND RELATED FIELDS OF EDUCATION

CONDUCTED BY FRANCES M. FOSTER

Parent Education and Child Study

Outlines of Child Study, by Benjamin C. Gruenberg, Editor. New York: The Macmillan Co., 1927, pp. 289.

Since the publication of the first edition of this book in 1922, interest in child study and parent education has become widespread, and contributions in this field have been numerous. This revised edition of the "Outlines" has made the new material available to the reader through the use of a carefully selected and extensive bibliography which is the most praiseworthy feature of the book. The "Outlines" represent the type of material and method of procedure used by the Study Groups of the Child Study Association of America. These groups were organized more than 20 years ago, principally for parents who were interested in studying problems of child training. The results of their experience form the basis for the present volume. Various topics are considered, ranging from practical problems such as "Aspects of Discipline," with subtitles "Freedom and Discipline," "Obedience," "Rewards and Punishments," to more academic considerations of individual differences, including topics of heredity and exceptional children. The general headings have been rearranged to correspond with the treatment in another recent book of the association, "Guidance of Childhood and Youth." Some new material has been added in this edition, a few combinations have been made, and a little of the contents of the earlier edition has been omitted.

Each topic is treated in three parts: First, a section which serves to orient the reader's approach to the subject by giving a brief summary of the present knowledge and point of view. Second, an outline which covers quite generally the facts and problems for which material is available. Third, a bibliography which includes popular, non-technical and technical references.

The treatment of the topics is modern and inclusive, so that a reader who uses the book as the chapter on "Suggestions for Study and

Reading" advises, will not only arrive at a better understanding of his own problems in connection with the training of children but will also be possessed of information from those scientific fields which contribute to a better understanding of human behavior, such as psychology, psychiatry, biology, and nutrition.

The presentation would seem to be more useful to the leader who is responsible for extending discussion by the introduction of more general material, than to the members of the group who are concerned primarily with the recognition and analysis of their own problems. Small discussion groups with the subject-matter contributed chiefly by the members is the usual method which prevails in beginning child study groups. Such first hand material has been sacrificed in the "Outlines" for a more academic and inclusive presentation.

This very completeness is likely to discourage individual thinking among the novices in the field. Had the compilers chosen to give a more detailed summary based on a representative meeting, including the personal illustrations and trend of the discussion, we would have had a more vital, suggestive, and stimulating volume.

MARY COVER JONES.

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SOCIAL ADJUSTMENT WRITTEN FOR COMMUNITY LEADERS

Social Adjustment by Robert Cloutman Dexter. New York: A. A. Knopf. Pp. XII + 424.

Business men are the most important figures in American communities. For the successful carrying out of any program of social work their cooperation and support is essential. At the present time, however, business men and other non-professional workers are, as a whole, totally indifferent to problems of social adjustment. Good intentions are their only equipment for cooperation. But as Bertrand Russell likes to remind us—the good life must be more than inspired by love; it must be guided by knowledge. Good intentions alone are inadequate, indeed, for coping with such problems as poverty, criminality, delinquency, old age. It is not necessary nor even desirable for community leaders to be experts in technique of social research but for their cooperation to be intelligently directed it is essential that they have a fairly comprehensive bird's eye view of the whole

field. The primary purpose of Social Adjustment is to furnish such knowledge within the covers of one volume in intelligible form.

The book is the product of a well-read and practical student of social problems. It is not intended to be and is not an intensive investigation of any one social problem. It seeks not, nor does it find, any single explanation for institutional ossification or what Ogburn calls, the "cultural lag." Its chief concern is not with social theory. The author is not in search of a Utopia. He has no pet tradition or scheme to impose upon all. He wants variability but not at the expense of stability. He does not favor the smashing of this sorry scheme of things entire because he wants humanity kept alive while the better scheme was getting ready to operate. He, therefore, favors a "one step forward and two steps back" policy. As he expresses it; "Here a little and there a little is a pedestrian sort of motto, but perhaps it will serve." Among the specific problems of social adjustment he considers from this opportunistic point of view are: Poverty, thwarted childhood, the feeble minded, old age, physical and mental health, criminality and sex. Chapter VI, called "Thwarted Childhood" is by far the largest in the book and includes the consideration of (*a*) the dependent child (*b*) children's agencies and institutions (*c*) the illegitimate child and (*d*) the delinquent child.

Doubtless, many an expert of the many special fields of knowledge made use of, will find errors in the chapter dealing with his special interest and may disagree with the interpretations made and conclusions drawn. Certain psychiatrists, for example, will argue and justifiably argue, that the author over-emphasizes the inheritance of mental diseases. Certain students of genetics may laugh at what they would call the author's naive and uncritical acceptance of the Dugdale study. Students of abnormal psychology like Conklin, who stress the application of the psychogenetic principle—the following up of the whole course of events which led to the difficulties being investigated will criticize the too arbitrary lines of demarcation drawn between aments and dements. Dr. Clendening might challenge the author's statement to the effect that private health as well as public health is purchasable. De Krief might argue against the desirability of such purchases. Certain students of social psychology will probably find the author's verbiage inaccurately implying a biological group-mind fallacy. Social scientists who are emphasizing the integrative factor in human experience will probably criticize the lack of emphasis of what M. P. Follet calls the plus-valences and the too ready

dismissal of the concept of social environment with the mere phrase without so much as mentioning the need for an analysis of contributing factors of the total situation as suggested by Sheffield. But the author does realize that social ends are not pre-existing things but eventual things. And when the nature and purpose of the study are considered, it is the opinion of the reviewer that this is an excellent work which should prove useful not only for the community leaders for whom it is primarily written but also for social workers, educators, clinical psychologists and psychiatrists who want a concise treatment of their everyday problems and who are interested in the further study of these problems.

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THE METHOD OF CLINICAL PSYCHOLOGY: ITS PRINCIPLES AND APPLICATIONS

Clinical and Abnormal Psychology, by J. E. Wallace Wallin. Boston: Houghton, Mifflin and Co., 1927. Pp. XXII + 649. $3.00.

A wealth of material on a timely subject is made available to the reader through this publication. An inspection of the book readily confirms the author's statement that material for a large series of volumes, the accumulated experiences and research work of a long period of years in the field of clinical psychology, has been condensed within the pages of a single volume.

The book is designed primarily as a text for students in clinical psychology and is to be accompanied by supplementary description, demonstration and experimentation. Much of the material constitutes a useful source of reference for the psychologist or specialist in child study. The general reader interested in clinical and abnormal psychology will find a treatment of the subject which demands study and reflection. The author chose between the two alternatives of treating many topics broadly rather than a few topics intensively, preferring the latter alternative so as to give the student "a systematic introduction to the art and science of clinical psychology."

The book is unique because of the inclusion within one volume of the principles of clinical psychology, the methods of mental investigation and a discussion of a wide variety of types of mental deviates. The author lists at the outset six possible fields of investigation in the

study of mental deviates. The book covers only one of the six fields mentioned, that of the mental investigation.

The book is divided into four parts: (1) Clinical examinations, general aims and principles. (2) Intelligence. (3) Motility. (4) Emotility. In general outline, the arrangement of the material in the latter part of the book follows closely the traditional arrangement of subject-matter of a textbook in psychology. The clinical point of view, the research material included, the illustrative case studies are distinguishing characteristics. The psychological background furnished the student is also for the most part traditional. The modern reader will observe few innovations aside from a statement of opposing views. Dr. Wallin is obviously a conservative psychologist with reference to the newest psychological theories. Each division of subject-matter is preceded by a discussion of the psychological principles involved.

In the forepart of the book there is an excellent chapter on the psycho-clinical examination, the technique, purpose and personnel. A basic outline for the clinical examination may be derived from the topics of later chapters.

The author distinguishes between the psychological and psychiatric approaches to the study of individual deviations. He emphasizes the need on the part of the psychologist for an understanding of the physical status of the individual and believes it difficult for the psychiatrist to work successfully without a foundation in clinical psychology. A distinction is drawn between the psychologist and the mental examiner. Wallin recognizes the need for the use of measurement by others than clinical psychologists.

The book contains a brief summary of different view points concerning the nature of intelligence, as well as the author's own point of view; the author's statement of criteria for determining the presence or absence of feeblemindedness; and many references to research undertaken to determine the nature of mental functioning. Dr. Wallin suggests that more research is needed in studying the process of recognition because of its importance to the school child in learning to read and in acquiring other classroom techniques.

The author lists the shortcomings which he finds in the method of psycho-analysis. He expresses belief in the therapeutic value of the method, but objects to the bizarre interpretations and fantastic explanations which the psycho-analyists offer. The real explanation of the cure effected may, he believes, be far simpler than the psycho-

analysts admit. The unconscious mind as a separate entity is in his opinion, undoubtedly a fiction.

The reader expects from the author's preface much more discussion of the problem school child than he finds in the book. Although in the earlier chapters the principle of individual differences in children in all capacities is fully presented, much of the material relates to separate mental processes and abnormalities largely restricted to adults. Deficiencies in mental processes rather than deviating individuals receive the greater share of attention. Sensory defects, defects in judgment and the like, rather than the "delinquent child" or the "psychopathic individual" functioning as a unit in society, receive the greater share of emphasis. Part of this deficiency is compensated for in the author's earlier book, "The Education of Handicapped Children." The case studies included illustrate the separate mental process rather than the deviating individual as a whole.

There is some lack of critical evaluation of the testing movement. Survey and diagnostic tests are not clearly differentiated. Some of the tests mentioned as suitable for diagnostic purposes are not highly reliable measures of anything.

The concentration of such a large body of material in such small compass gives the impression that too much has been included. Some topics might well have been omitted entirely without destroying the value of the book. Some of the material is irrelevant and the inclusion of such a topic as the description of the different schools of psychology adds to the length of the book without greatly increasing its value.

On the whole, the usefulness of the book is unquestioned. It contains results of some of the most exhaustive research so far undertaken in the study of mental deviation. To place the accumulated findings in the hands of prospective psycho-clinicians should serve immeasurably to stimulate further progress and to improve the calibre of those who are training for work in the field.

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A Laboratory Psychology

Psychology by Experiment, by L. W. Kline and F. L. Kline. Boston: Ginn and Company, 1927. Pp. XII + 338.

"Psychology by Experiment" seems to be a useful and adaptable textbook for laboratory psychology. Although its principal purpose is to guide experimental study, it is something more than a manual. The experiments are classified under the traditional topics of psychology, from "Movement" to the "Emotions," each topic accompanied by a general outline and an extended discussion. Considerable pains have been taken to make clear the definitions of terms, both in the text itself and in a Glossary-Index.

The large number of experiments, 109, affords opportunity for selection either by the preferences of the instructor or because of the limitations of the laboratory. Many of the experiments require only the simplest apparatus and allow full concentration on the problem itself, without distractions attendent upon technical niceties. Others employ more precise apparatus, giving opportunity for manipulative practice in better equipped laboratories. Statistical procedure has been introduced, but has rightly been kept to a minimum of complexity.

The mechanical make-up of "Psychology by Experiment" is attractive and practical. The illustrations and diagrams have been well chosen and are of a nature to assist rather than to mystify the beginner. An interesting feature is a new and quite complete set of photographs of expressions of the emotions, which may well supplement the excellent but now somewhat shopworn set of Ruckmick.

Instructors in experimental psychology will find much to recommend this book either as a class text, or as suggestive reference work for the preparation of their own courses of study.

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A NOTE

March 26, 1928.

To the Editor of The Journal of Educational Psychology
Sir:

In the March number of your journal Lehman and Witty publish an excellent article on fallacies in statistics as applied to education. They themselves seem unscientific in attributing to me an article that appeared in *School and Society* over the signature of a Mr. Flaccus. The correlations therein presented between the percentages of pupils studying Latin in the several states and other manifestly unrelated phenomena, such as the homicide rate, were obviously satire. As I reread the article it seems to me to make the same point, though more subtly, than Lehman and Witty do. Is it possible that scientific acumen is negatively correlated with a sense of humor?

Yours truly,
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